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A Review of Venom Toxinology and Epidemiology of Envenoming of the Bushmaster (<i>Lachesis</i>) with Report of a Fatal Bite . . .	
. . . David L. Hardy, Sr., M.D., and Juan José Silva Haad, M.D.	113
On the Establishment of the Pacific Chorus Frog, <i>Pseudacris regilla</i> (Amphibia, Anura, Hylidae), at Ketchikan, Alaska . . .	
. . . Dana L. Waters, Thomas J. Hassler and Bradford R. Norman	124
HerPET-POURRI	Ellin Beltz 128
Currently Happening Stuff	Gary Kostka 131
Herpetology 1998	135
Advertisements	138
Unofficial Minutes of the CHS Board Meeting, May 15, 1998	139
News and Announcements	140

Cover: Central American bushmaster (*Lachesis stenophrys*), Panama City, Panama, 1948. Photograph by Harold Trapido, with permission of Jean Trapido, and courtesy of David L. Hardy, Sr.

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A Review of Venom Toxinology and Epidemiology of Envenoming of the Bushmaster (*Lachesis*) with Report of a Fatal Bite

David L. Hardy, Sr., M.D.*
Research Consultant
Arizona Poison and Drug Information Center
P.O. Box 245079
Tucson, AZ 85724-5079
E-mail: <dhardysr@theriver.com>

Juan José Silva Haad, M.D.
Calle 146 No. 17-21, Conjunto Los Sándolos
Casa No. 15, Barrio Créditos
Santafé de Bogotá, D.C.
Colombia

Abstract

A case of fatal envenoming is reported for the bushmaster (*Lachesis m. muta*) in Colombia. The bushmaster's recently revised taxonomy is summarized. The epidemiology of human envenoming by *Lachesis* is reviewed. Also reviewed for this genus are venom toxicity, biochemical and physiological aspects of the venom, and antivenoms. Finally, a disparity is noted between venom characteristics in the laboratory and clinical reports of envenoming by the *matabuey* (*L. stenophrys*) and the *terciopelo* (*Bothrops asper*) in Costa Rica.

Case Report

On 12 March 1989, in rural Amazonas State, Colombia, an adult male indigene was bitten on the lower leg by a large (~2.5 m) *verrugosa* (*Lachesis m. muta*) identified by the victim and his family. His initial care was by a "promotor indígena" who administered two ampules of antivenom intramuscularly (i.m.) Fifteen hours after being bitten, the victim was admitted to the Puerto Nariño Hospital. The physician there noted nonclotting blood upon arrival and administered an additional four ampules of antivenom intravenously (i.v.) along with i.v. fluids in moderate amounts. By the second day there was painful diarrhea with concomitant dehydration, and hypotension (abnormally low blood pressure, shock) ensued.

Three days later, on 15 March, the patient was transferred to the Leticia Regional Hospital, Leticia, Colombia, where he was treated by one of us (JJSH). Upon arrival the leg was markedly swollen with extensive areas of ecchymosis (bleeding under the skin) and evidence of significant infection. Coagulation tests were unremarkable (fibrinogen 380 mg/dl, bleeding time 1.5 min, prothrombin time 20 s, and platelet count normal), the possible result of previous antivenom administration. The patient was also suffering from acute renal insufficiency presumably due to a prolonged period of hypotension. Treatment consisted of i.v. fresh whole blood and crystalloid solutions, ampicillin, metronidazole, hydrocortisone, dopamine and norepinephrine. On 16 March the patient underwent extensive surgical debridement through an antero-medial incision of the lower leg, and extensive hemorrhagic necrosis of the muscle was encountered. Despite treatment, the hypotension became irreversible and the patient died 4 days post-envenoming.

Revised Systematics of *Lachesis*

The systematics of the genus *Lachesis* has recently been revised (Zamudio and Greene, 1997; for summary see Bull. Chicago Herp. Soc. 33(3):68, 1998) with the elevation of two

taxa in Costa Rica to full species based upon morphology, molecular studies and behavior. The new taxonomy is as follows and will be substituted throughout the text where applicable:

<i>Lachesis stenophrys</i>	Atlantic versant of Costa Rica, Panama and northwestern South America
<i>L. melanocephala</i>	Pacific versant of southern Costa Rica
<i>L. muta muta</i>	Amazon Basin
<i>L. m. rhombeata</i>	eastern coastal forest of Brazil

The cis-Andean samples were less differentiated than the trans-Andean species, and were not elevated to full species. In fact, although data were limited, there was some indication the continued use of subspecific designations within *L. muta* might not be warranted.

Hoge described the Atlantic Forest bushmaster as *L. m. noctivaga* in 1966, then later discovered there was a name available (*Lachesis rhombeata* Wied, 1824) and corrected the situation in 1978.

Some common names by country are as follows: Brazil—*surucucu*; Colombia—*verrugosa*; Costa Rica and Panama—*cascabela muda*, *matabuey*; Costa Rica (Pacific versant)—*plato y negro*; Ecuador and Peru—*shushupe*; and Venezuela—*cuaima* (Campbell and Lamar, 1989; p. 307). The English common names are Central American bushmaster (*L. stenophrys*), black-headed bushmaster (*L. melanocephala*), and South American bushmaster (*L. muta*) (Zamudio and Greene, 1997). Atlantic Forest bushmaster is used for *L. m. rhombeata*.

Epidemiology of Envenoming by *Lachesis*

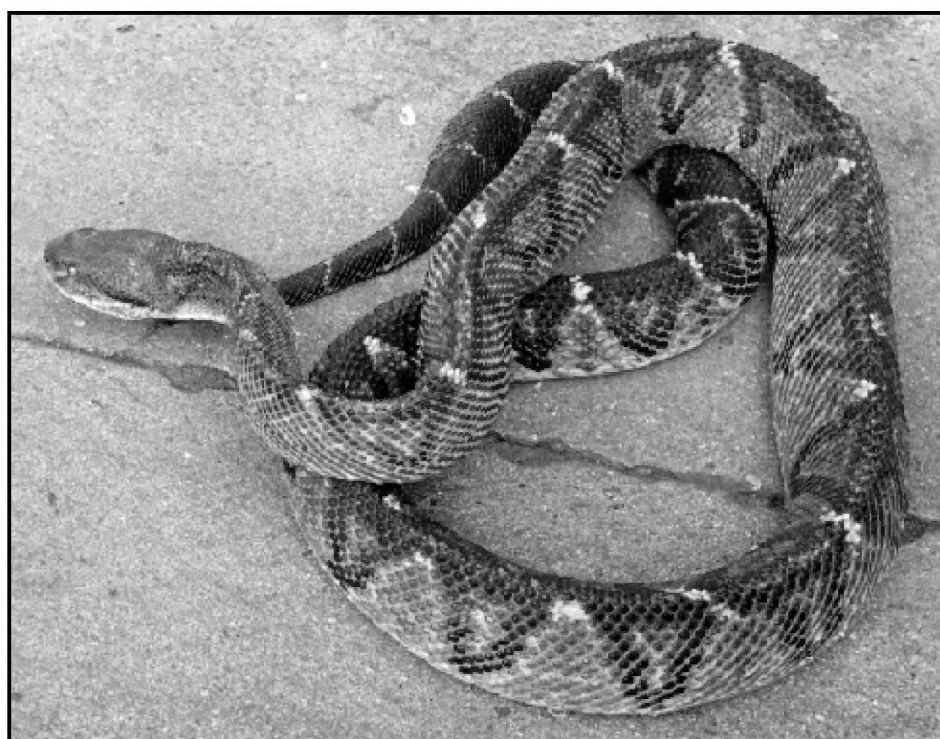
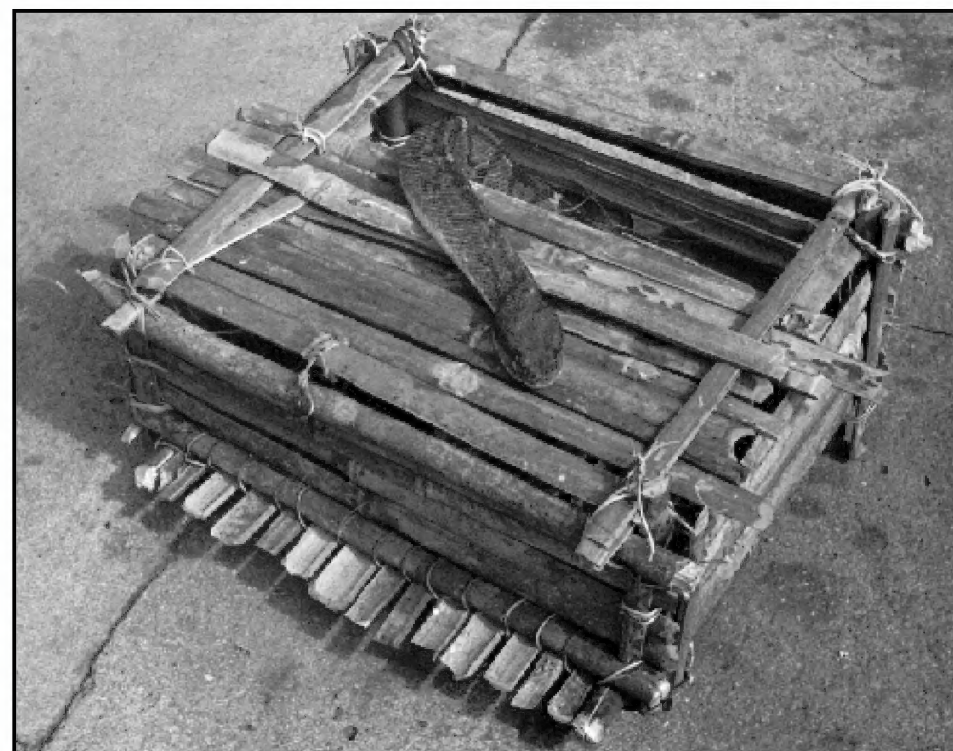
One of the great explorer-naturalists of the 19th century, Prince Maximilian of Wied-Neuwied, said that there were many instances of fatalities from bushmaster bites, and told of two victims who died in six and 12 hours respectively (Brehm 1912; p. 547, as paraphrased in Minton and Minton, 1973; p. 245). However, the Mintons point out that Wied-Neuwied was

* The senior author dedicates this paper to the late Harold Trapido who was hero and mentor to a high school student (and aspiring herpetologist) in the Panama Canal Zone, 1948–1950.

referring to the country near Rio de Janeiro, where the bushmaster is very uncommon, but another large pitviper, the *jararacuçu* (*Bothrops jararacussu*), is relatively plentiful. The bitten men bled from the nose, mouth and ears, a characteristic of bites by *Bothrops*. This would seem to cast doubt on this early report.

Mole (1924; pp. 468-471) relates from the Hon. Albert B. Carr what may be one of the earliest detailed accounts of a bite from *Lachesis*. In 1898 on the island of Trinidad, Carr reached into the burrow of a “Lappe” (Rodentia: *Agouti paca*) and felt a sharp stab and upon withdrawing his hand, saw the head of a large “Mapepire Z’Ananna” (*L. m. muta*) holding on to his

thumb. The snake let go and immediately withdrew into the burrow. Crossed incisions were made into the puncture sites, an “antidote” applied, and a tight ligature put on at the wrist. He then drank the rest of the “antidote.” Soon after the bite, “there followed intense pain, accompanied by a feeling of cold, attended by shivering and giddiness.” Carr hiked three miles through the forest to his dwelling, and by midnight his hand was the “dimensions of a three-quarter-sized football.” He had severe pain in the wound, armpit, chest and abdomen and about eight hours postbite, vomited “congealed blood” (hematemesis). Four hours later, the swelling was easing and he was able to take coffee. Eventually he recovered but the thumb was reduced



In December 1948, a Panamanian hunter arrived at Gorgas Memorial Laboratory in Panama City in formal attire with dress shirt, tie, slacks and hat. He was carrying a hand-made, bamboo-slatted box. Roaming free within the box was a live adult Central American bushmaster (*Lachesis stenophrys*) he wished to sell. In the courtyard behind the main laboratory, Harold Trapido (1916-1991; Copeia 1992:272-273) took a number of photographs of the snake and its captor. To the surprise of everyone, the snake hunter free-handled the snake—and also demanded a price of \$40 (a lot of money in those days). Adult *terciopelos* (*Bothrops asper*) fetched \$2. Bushmasters were rarely captured alive, and there were few in captivity. The hunter said he handled the snake without restraint because he had removed the fangs (*L. stenophrys* is known to often be calm and not inclined to strike). This concerned Trapido because the snake could have been injured, but after examination showed its mouth to be clean and the fangs intact, the full amount was paid. The bushmaster later made its way via air freight to Carl Kauffeld at the Staten Island Zoo. There it died three months later of a “parasite overload” or more likely of what we now know as “maladaptation syndrome.”

Harold Trapido was a medical entomologist and made many significant discoveries as a Fellow of the Rockefeller Foundation serving in Poona, India, and Calí, Colombia, as well as the earlier 12 years in Panamá. He was also well known as a herpetologist: he published *Snakes of New Jersey* in 1937 and described *Natrix (Nerodia) harteri* in 1941. His Ph.D. thesis (1942; revision of the genus *Storeria*; Cornell University under Albert Hazen Wright) was completed during W.W. II while serving in the U.S. Army. The war redirected his research as he became involved in the control of mosquitoes using a new compound—DDT. He also was instrumental in the discovery and study of sylvan yellow fever in Panama in 1948 which resulted in vaccination of the entire isthmian population. Many lives were saved as yellow fever is frequently fatal. Trapido deposited part of his preserved herpetological collection from Panama in the Field Museum of Natural History, where it numbers nearly 2,000 specimens.

to three-quarters size and he did not return to work for five weeks. The fact that Carr had many previous encounters with this species appears to enhance the accuracy of his identification.

Ditmars (1933; pp. 244-245) stated, "From a reliable source the writer is informed that a man bitten in the thigh by an eight-foot bushmaster died in less than ten minutes—the long fangs apparently wounding an important blood vessel."

Among 55 snakebite cases treated at the Gorgas Hospital in the Panama Canal Zone between 1925 and 1951, one bite was attributed to the bushmaster and it was not fatal (Jutzy et al., 1953).

A tabulation of bites for Brazil by the *surucucu* (*L. m. muta*) is as follows: 1902–1945, 16 bites with one fatality (Fonseca, 1949); 1954–1965, no bites by *Lachesis* reported (Rosenfeld, 1971); 1966–1977, 2,928 venomous snakebites with two from *Lachesis* without a fatality (Cardoso and Brando, 1982); 1985, 500 pitviper bites were reported and none were identified as due to *Lachesis* (Kamiguti and Cardoso, 1989); 1986–1988, 6,308 venomous snakebites were reported for the state of São Paulo and although 99% were from pitvipers, none were reported as due to *Lachesis* (Ribeiro et al., 1990). The Brazilian Health Ministry officially registered 27,000 venomous snakebites from June 1986 to December 1987, with 2.9% identified as *Lachesis* (Alves et al., 1991).

The first detailed clinical report of *Lachesis* envenoming was by Silva Haad (1982) in Leticia, Colombia. Two cases of pitviper envenoming were verified by the author as by the *verrugosa* (*L. m. muta*). An adult male was bitten on the forearm by a snake 2.05 m in length and an adult female was bitten on the lower leg by another 1.5 m in length. Both patients survived with remarkably similar clinical courses and were treated with i.v. Instituto Butantan bivalent antivenom (*Crotalus–Bothrops*), 30 and 20 vials respectively. There was intense pain and progressive swelling of the extremity with bleb formation. Hypotension and bradycardia occurred early on which gradually returned to normal. A prominent component of the clinical picture was colicky abdominal pain and diarrhea. Although a coagulopathy (hypofibrinogenemia) was present, hemorrhage into gingiva, intestine or kidneys did not occur. In both cases recovery was complete without local necrosis or other complications.

In Cayenne, French Guiana, four cases of bushmaster (*L. m. muta*) bite recovered, but in one there was a contracture at the ankle (Hulin et al., 1982).

Martén (1978; pp. 471-475) reported a series of 165 children admitted to the Hospital Nacional de Niños "Carlos Saenz Herrera," San José, Costa Rica, with venomous snakebite. There was only one case identified as a *Lachesis* bite, although in 67 of the cases the snake's identity was unknown. This single patient had "complications" ("abscesses, local necrosis, minor joint stiffness"). There were no fatalities in this series.

Minton and Minton (1980; pp. 81-83) reviewed medical records at the Hospital San Juan de Dios in San José, Costa Rica, and found that among 104 snakebite cases admitted dur-

ing the middle 1950s, none were attributed to the bushmaster.

In Costa Rica, Bolaños (1982, 1984; pp. 98-100) and Bolaños et al. (1982) reported the clinical course of four severe envenomings on the Atlantic versant by *matabueyes* (*L. stenophrys*) in which the snakes were identified and the length was greater than 2 m. Three of the four bites were fatal. The initial symptom was intense pain which persisted throughout the clinical course. The most prominent sign was massive edema involving the entire extremity within one to two hours which later advanced into the abdomen in lower extremity bites, and trunk and neck in upper extremity bites. Although erythema (reddening of the skin) and ecchymosis were common, there was no bleb formation, as is frequently the case in *Bothrops* envenoming. There was mild spontaneous hemorrhage from puncture sites, but this subsided. In other areas the hemorrhage was confined to muscle tissue of the involved extremity. One victim presented with severe hypotension (45/35) two hours post-envenoming, but responded to treatment. A second had a gradual decline in arterial pressure over the three days prior to his death. The two others remained normotensive. Coagulation studies indicated primarily a marked fall in serum fibrinogen level. The patients underwent surgical intervention of fasciotomy or amputation.

In the three fatal cases, there were massive necrosis and tissue suppuration (formation and discharge of pus) with evidence of extensive infection. Whether contamination of the wounds was from the snakes' fangs or introduced later could not be determined. Skin necrosis was present in only one patient and was confined to a small area around the fang puncture sites. The first three patients were given polyvalent antivenom (*Crotalus–Bothrops–Lachesis*) produced at the Instituto Clodomiro Picado, University of Costa Rica, 10 vials (5 vials i.m. and 5 vials i.v.) in the first one to two hours postbite. Death occurred on the third to fifth day. The fourth patient was given 10 vials i.v. at three hours and 10 more i.v. at 24 h postbite. Although he survived, there was a residual contracture of the lower extremity at the knee. The three patients who succumbed appeared to improve during the initial 36 h, but then went "down hill" despite continued therapy. The fourth patient rallied initially and continued to improve.

Two cases are known to have occurred in Costa Rica in 1985 and 1987 (J. M. Gutiérrez, 1986, 1988 pers. com.). One was fatal and the other suffered extremity contracture despite hospitalization and treatment with antivenom.

Cerdas et al. (1986) reported a series of 164 cases of snakebite from the region around Guápiles, Costa Rica, for the years 1974 to 1984. Composition of species involved was consistent with previous reports (Bolaños, 1984) as 44% were inflicted by the terciopelo (*Bothrops asper*) and 40% were not identified. There were three bites by *L. stenophrys* in this series, but details were not included. Cerdas (1987 pers. com.) has indicated none of the three were in the "grave" (severe) classification and therefore were more likely in the "moderado" (moderate) group, but no other information was available.

Guderian et al. (1986) mentions a nonfatal case of envenoming by *L. muta* in Ecuador.

In Colombia, Angel Mejía (1987; p. 167) reviewed the case histories of 107 snakebite patients in the cities of the Department of Antioquia and reports that only two were by *L. stenophrys* and that both were “grave” (severe).

Recently, Kamiguti and Cardoso (1989) summarized the cases treated at the Hospital Vital Brazil during the year 1985 by the genus of snake involved. Of 500 pitviper bites, there were 471 *Bothrops* and 29 *Crotalus* bites, and none were identified as bites by *Lachesis*, which is uncommon in southeastern Brazil.

Of 294 victims of snakebite treated in eastern Ecuador, 36 were said to have been bitten by *Lachesis* (Kerrigan, 1991). However, it was later determined by DLH that Kerrigan had misinterpreted the local name “*equís*” as being *Lachesis* when it actually refers to *B. atrox* (K. R. Kerrigan, 1991 pers. com.). This error was unfortunately never communicated to the journal for a published clarification.

Otero Patiño et al. (1993) report five bites by *L. stenophrys* in northwestern Colombia in one year of which two were graded as moderate and three were severe. Complications were necrosis (60%), hypotension (20%), coagulopathy (100%), and renal failure (60%). Bites by *Lachesis* were 2% of 244 bites in one year in this region.

In Brazil, a 28 y old male was bitten on a finger by an adult *L. m. muta* and was given 8 ampules of antivenom (Instituto Butantan) 2 h postbite (Jorge et al., 1993, 1997). His clinical course was marked by significant diarrhea and vomiting treated with 5 L of i.v. crystalloid solution. Recovery was complete and without complications.

In Venezuela, a 28 y old male was bitten on the hand by a “juvenile” bushmaster (*L. m. muta*) which was followed by intense local pain, and rapid swelling (Torres et al., 1995). Forty-five minutes later there were intense sweating, vomiting, diarrhea, strabismus (eyes diverged to right and left), difficulty speaking and swallowing, slowing of the heart rate and fall in systemic blood pressure with respiratory distress. There was also a significant coagulopathy which was relatively unaffected by administration of 100 ml of *Bothrops*–*Crotalus* antivenom. No lasting sequelae were mentioned.

A severe bite by *L. m. muta* occurred in southeastern Peru and resulted in disarticulation at the hip (Mellor and Arvin, 1996). Early treatment was complicated by the long interval (25 h) required for evacuation to a second level medical facility.

On 28 April 1998, a Costa Rican snake hunter sustained an interactive (illegitimate) bite to the dorsal aspect of the left forearm by a captive 2.05 m male bushmaster, and arrived at the hospital in Turrialba 30 min later (J. M. Gutiérrez, W. W. Lamar and A. Solórzano, May 1998 pers. com.). He was given a total of 20 vials of antivenom i.v., and although he vomited soon after the bite (diarrhea was not present), he fainted upon arrival and later had difficulty with speech. Local venom effects were severe, and the extremity was fasciotomized several days later to relieve pressure. The snake had been captured in Valle de la Estrella, southeastern Limón Province, Caribbean versant.

The *plato y negro* (*L. melanocephala*) of the Pacific versant in southern Costa Rica, has been described as more “aggressive” and prone to strike (Solórzano and Cerdas, 1986), especially when compared to the Atlantic versant *L. stenophrys* (Bolaños et al., 1978). Although bites from *L. melanocephala* have occurred (J. M. Gutiérrez, 1988 pers. com.), there are no reports in the literature (Roboz, 1959; Jiménez and García, 1969; Alfaro Brioso and Boza Mora, 1983; De Franco Montalvan, 1983; De Franco Montalvan et al., 1983).

Based on 20 cases of *Lachesis* envenoming reported in the literature where snakes involved appeared reliably identified, a syndrome of nausea, vomiting, abdominal colic, diarrhea, sweating, hypotension, bradycardia and shock has been recently described (Jorge et al., 1997). This assemblage of signs and symptoms is not seen with other crotaline snakes, and appears to be unique to many geographical populations of *Lachesis*. The recent case in Peru had nausea only and no other abdominal signs and symptoms (Mellor and Arvin, 1996). In the case reported here, colic and diarrhea were present which is similar to the syndrome above (Jorge et al., 1997). A recent study of venoms from *Lachesis* with localities in Brazil, Colombia and Costa Rica showed relatively little variation in the pharmacology and biochemistry, and did not confirm the geographic implications of the clinical picture above (Otero et al., in press).

Epidemiology Using Human Serum Antibodies

An epidemiological study of snakebite in Ecuador using an enzyme-linked immunosorbent assay (ELISA) technique to detect antibodies to venom in the serum of Indians giving a history of snakebite indicated the incidence of *Lachesis* bites to be 18% (Theakston et al., 1981). However, they cautioned that cross reactivity with *Bothrops* may have occurred.

The snakebite incidence in French Guiana has been studied by Chippeaux and Theakston (1987) using the ELISA to detect antibodies in persons with a documented history of venomous snakebite. Of 43 victims tested, 22 were positive for antibodies to snake venom. Surprisingly, antibodies against *Lachesis muta* were present in 15 (almost 70%) and against *Bothrops atrox* in only 2 (about 10%). Yet *B. atrox* is the most common species found in that country and *L. muta* is infrequently collected according to the authors. Possible reasons given for this discrepancy were that the latter is more difficult to capture due to its temerity and large size, and that the former may be less aggressive and inject less venom. However, there is the possibility that species identification by this laboratory method was not accurate. The problems of nonspecific reactions and cross reactivity in a low prevalence setting when using this assay for venom antibody identification have been discussed by Ho et al. (1986). Unfortunately, this paper and that of Kerrigan (1991) above have suggested bites by *Lachesis* are common in South America which does not appear to be the case. Government figures in Brazil indicate the incidence of *Lachesis* is approximately 1.4 to 2.9% of all venomous snakebite, a low incidence.

ELISA was modified to distinguish *Bothrops* from *Lachesis* in patients bitten by a pitviper in areas of Brazil where both are

found (Chavez-Olortegui et al., 1993). Such a technique would allow correct antivenom selection in bites where the offending snake's identification was unknown, and given the serious nature of *Lachesis* envenomings, it would be a major therapeutic breakthrough. A recent case has indicated *antibiotrópico* antivenom is not protective against coagulant venom effects of *Lachesis* venom (Bard et al., 1994) (see below under Antivenom).

The ELISA testing for antibodies to venom appears to show that relatively few bites are inflicted by *Lachesis*. In ongoing studies in Brazil in individuals with a history of pitviper bites, the identification of the snake was compared to that of the ELISA test (J. L. Cardoso, 1993 pers. com.). Of those who exhibited antibodies, the *surucucu* (*L. m. muta*) was identified as the offending snake in 8 of 13 (62%), yet the test indicated all bites had been by *Bothrops*, and not by *Lachesis*. This suggests the species entered on the government's snakebite form was frequently inaccurate due to a lack of knowledge on snake identification, confusing common names, or for other reasons.

Questionnaires were given to 295 rubber tappers and Amazonian Indians in the State of Acre, Brazil, and 250 had a positive history of one or more snakebites (393 total bites) (Pierini et al., 1996). Observations by those bitten suggested the 38% were from *B. atrox* and 32% from *L. m. muta*. Of 45 individuals who claimed to have been bitten and also tested with an enzyme immunoassay (EIA) for venom antibodies, 14 (31%) had antibodies. Of those, only 2 (14%) tested positive for *Lachesis* (86% were positive for *Bothrops*). The authors felt snakebite victims would tend to exaggerate the importance of *Lachesis* because it is larger and said to be more aggressive.

Venom yield and toxicity

At the Instituto Clodomiro Picado in Coronado, Costa Rica, venom yields for 19 *L. stenophrys* with an average length of 1.93 m and extracted for the first time, averaged 233 mg dry venom with a maximum of 333 mg (Bolaños, 1972). After the snakes remained in captivity, the average venom yield fell to 64 mg. Average yield was 325 mg for *L. m. muta* from Pará state in Brazil (Sánchez et al., 1992). A single maximal yield of 407 mg is reported from an individual from the state of Goiás (Da Silva et al., 1989).

Schöttler (1951) reported the lethal dose (LD₁₀₀) for *L. m. muta* as 37 mg/kg subcutaneous (s.c.) in mice, whereas the minimum lethal dose for *L. m. muta* from the Amazonas region of Peru was 0.6 mg per 20 g mouse by the i.m. route (30 µg/g) (Esquerre, 1976; p. 115). (It should be noted that mg/kg and µg/g are equivalents.) The 50% lethal dose (LD₅₀) for the venom has been variously reported as follows: *L. stenophrys* 5.5 mg/kg i.v. and 6.2 mg/kg intraperitoneally (i.p.) in mice (Bolaños, 1971; p. 29); 95 µg i.v. (5.6 µg/g) and 110.5 µg i.p. (6.5 µg/g) in 16–18 g mice (Bolaños, 1972) and 112 µg (6.6 µg/g) in 16–18 g mice; and for *L. melanocephala* 8.9 µg/g. For *L. stenophrys* in Colombia 9.8 µg/g (Bolaños et al., 1978), and 6.8 µg/g for *L. stenophrys* from the Pacific Coast of Colombia (Otero et al., 1992). For *L. melanocephala* the LD₅₀ was 103 µg i.p. (6 µg/g) in 16–18 g mice (Gutiérrez et al., 1987).

Ontogenetic changes in toxicity for *L. stenophrys* are reported by Gutiérrez et al. (1990) (see below).

Biochemical and Physiological Effects of Venom

Lachesis venom has been characterized as follows: proteolytic activity (Deutsch and Diniz, 1955), proteolytic activity of *L. stenophrys* venom on casein (Lomonte and Gutiérrez, 1983), isolation of phosphodiesterases A₂ (Yarlequé and Campos, 1973, 1978; Fuly and Zingali, 1993), nucleotidases (Campos and Yarlequé, 1974, 1978), lactose-binding lectins (Ogilvie et al., 1986), arginyl esterases and arginine ester hydrolase from the venom of *L. m. noctivaga* (= *L. m. rhombeata*) (Magalhães et al., 1978; Silva et al., 1985), two proteinases purified and characterized (Rodríguez and Yarlequé, 1990), proteolytic properties of *L. stenophrys* venom (Yarlequé, 1978), proteolytic activity on casein (Lomonte and Gutiérrez, 1983; Morante and Yarlequé, 1980), metalloproteinases (Sanchez et al., 1982, 1987, 1991a,b, 1993, 1995), isolation of a gyroxin analog (Da Silva et al., 1989) and a thrombin-like/gyroxin enzyme (Aguiar et al., 1996), hemolysis (Cadillo et al., 1991; Cruz and Yarlequé, 1984), venom antigens (Heneine and Catty, 1993), and the effect of storage conditions (Gené et al., 1985).

Venom Effects on Coagulation

Coagulation effects of *Lachesis* venom are summarized as follows: relationship of coagulant to proteolytic activity of *L. muta* venom in vitro (Jánsky, 1950; Rosenfeld et al., 1959), thrombin-like enzyme (Campos et al., 1988; p. 107; Chamone et al., 1979; Copley et al., 1973; Magalhães et al., 1973, 1993a,b,c, 1997; Vidigal Silveira et al., 1989), same enzyme from *L. m. noctivaga* (*rhombeata*) further characterized (Magalhães and Diniz, 1979; Magalhães et al., 1981, 1997), coagulant proteinase (*mutasa*) from *L. muta* (Aragón-Ortiz, 1982; p. 22), a different thrombin-like enzyme *stenoxobin* from *L. stenophrys* (Aragón-Ortiz and Gubensek, 1993), hemagglutinating protein (*mutina*) from *L. muta* (Gómez and Aragón, 1982; p. 29), purification and partial characterization of an L-amino acid oxidase hemorrhagic factors (Sánchez and Magalhães, 1991), method of calculating the "hemolytic power" for *L. stenophrys* (Gómez-Leiva, 1983), fibrinogen-clotting enzyme isolated and characterized from the venom of *L. m. muta* of Peruvian origin (Yarlequé et al., 1989), isolation of thrombin-like enzyme from *L. stenophrys* (Aragón-Ortiz, 1986), hemorrhagic effects (Gutiérrez and Chaves, 1980; Sánchez et al., 1987), and coagulation disorders from envenoming (Torres et al., 1995).

Other Aspects of Venom

Immunological comparison of venoms indicates that *L. stenophrys* and *L. melanocephala* are similar, but certain differences show a closer relationship of the latter to *L. stenophrys* of Colombia (Bolaños et al., 1978). The LD₅₀ values for these two species' venoms are also very similar.

Arroyo et al. (1980) have shown that *L. muta* venom collected under sterile conditions from recently captured animals contained an abundant bacterial flora consisting mainly of clostridia and the Enterobacteriaceae. However, they recom-

mended that the antibiotic sensitivity of the isolated organisms be determined so that a suitable antibiotic can be chosen. They also suggested that in an emergency, penicillin combined with a broad-spectrum antibiotic such as chloramphenicol or tetracycline may prove effective in most cases.

The ontogenetic changes in the venom of *L. stenophrys* have been studied with the surprising finding that hatchlings (15–20 d) produced venom nearly devoid of toxicity as follows (LD₅₀, µg/g, i.p.): age 15–20 d, >24; age 1 y, 9.2; age 2 y, 11.8; and age 5 y, 6.3 (Gutiérrez et al., 1990). The venom of hatchlings from two clutches showed little lethal, hemorrhagic, edema-forming, myotoxic, proteolytic or phospholipase A₂ activity. However, anticoagulant effect on plasma was maximal. As snakes aged all activities increased in their venom. The 45 newborn *Lachesis* in this study did not release live mice on any occasion when striking. This behavior has been observed by others (Boyer et al., 1995; DLH, 1976 pers. obs.). The anticoagulant effect may correlate clinically with the case from Venezuela above (Torres et al., 1995).

The *zopilota* (*Clelia clelia*), a large, opisthoglyphous, ophiophagous, Neotropical colubrid snake, has high resistance to local effects and lethality from the venom of *L. stenophrys* (Cerdas and Lomonte, 1982).

Antivenom

Edema-producing properties of venom, and its neutralization by antivenom in laboratory animals have been quantified (Lomonte, 1985; Gutiérrez et al., 1986).

Neutralization of proteolytic and hemorrhagic activities of *L. stenophrys* venom by a polyvalent antivenom has been reported by Gutiérrez et al. (1985). Venom was injected i.m. and when antivenom was given i.v. at the same time, the reduction in venom effects was significant. However, antivenom was not effective against local tissue reaction when given 15 min after venom injection, presumably due to the rapid onset of local venom toxicity.

In Costa Rica, polyvalent antivenom (anti-*Bothrops*–*Crotalus*–*Lachesis* equine) is produced at the Instituto Clodomiro Picado for both human and veterinarian use. It is also produced from sheep (ovine) for use in individuals allergic to horse proteins (Bolaños and Cerdas, 1980). This antivenom has been shown to effectively neutralize the venom of *L. stenophrys* and is standardized so that 1 ml will neutralize 2.5 mg of venom when mixed and incubated for 30 min prior to injection into mice (Bolaños and Cerdas, 1980). It is equally effective against *L. melanocephala* venom under the same conditions (Bolaños et al., 1978), and under conditions closer to the clinical situation where venom and antivenom were injected independently, in some cases with time delay for the antivenom (Gutiérrez et al., 1987).

In Ecuador, Theakston et al. (1995) screened five antivenoms for their effectiveness against five pitviper venoms of the region. Only monospecific *L. muta* antivenom (Instituto Butantan) was effective against Ecuadorian *Lachesis*—Colombian polyspecific antivenoms were not.

In Manaus, Brazil, envenomings by *Lachesis* have been treated in the past with *antibotrópico* antivenom when *anti-laquéético* and *antibotrópico-laquéético* antivenoms were not available. After the coagulopathy in a patient bitten by *Lachesis* did not respond to *antibotrópico* antivenom, laboratory studies indicated the latter was nine times less protective against coagulant venom effects of *Lachesis* venom (Bard et al., 1994). The authors suggest *antibotrópico* antivenom not be relied upon to treat coagulant effects of *Lachesis* envenoming.

Lachesis stenophrys and *Bothrops asper* Venom Effects: Laboratory Studies versus Clinical Data

Comparing laboratory studies of venom with clinical reports of bites by the *matabuey* (*L. stenophrys*) and the *terciopelo* (*B. asper*) in Costa Rica reveals a disparity.

Contrasting the two snakes, the *matabuey* can be characterized as being long (adults, 1.5 to 2.5 m), with a proportionally smaller head and venom gland (pers. obs.), smaller initial venom yield (233 mg) including a maximum yield of 407 mg (Da Silva et al., 1989), and lower i.v. venom toxicity for laboratory mice (LD₅₀ 5.6 µg/g in mice). The *terciopelo* is also long (adults, 1.2 to 2.5 m), has a proportionally larger head and venom gland, and a larger initial average venom yield of 485 mg, including a maximum individual yield of 1,530 mg (Bolaños, 1972). Its venom was more toxic to mice at 1.1 µg/g i.v. These venom yields and LD₅₀s from the laboratory suggest that the *terciopelo* is potentially more lethal than the *matabuey* in terms of an individual human envenoming.

Of the 11 species of pitviper recorded for Costa Rica, it is clear from various reports, that *B. asper* is by far the most important in terms of total numbers of bites and in the degree of morbidity and residual disability that result (Bolaños, 1984). In a tabulation of bites in Costa Rica for the year 1979, there were a total of 416 pitviper bites of which 220 (53%) were from *B. asper* and two from *L. stenophrys* (0.5%) (Bolaños, 1982). The incidence of fatal *B. asper* envenoming in this study was 7%.

An analysis of case histories of 10 biologists bitten by *B. asper* in Middle America showed that of nine envenomed, six were severe, but there were no fatalities (Hardy, 1994a,b). A review of the literature indicated that in Central America the overall fatality rate from *B. asper* envenoming was about 1% (Hardy, 1994b). A more recent data analysis suggests that since 1970 in Costa Rica it may be closer to 2% (Rojas et al., 1997; J. M. Gutiérrez, 1998 pers. com.).

Throughout its distribution, *B. asper* is the most important pitviper in terms of morbidity (Hardy, 1994b). Despite its apparent potential to produce death based on the nonclinical data (high venom yield; high toxicity in laboratory animals), it nevertheless has a surprisingly low incidence of mortality (1–2%). Its epidemiological importance arises from the large number of individuals bitten annually resulting in significant morbidity and disability.

If the small series of *L. stenophrys* envenomings on the Atlantic versant of Costa Rica related above (Bolaños et al., 1982; Cerdas et al., 1986; Gutiérrez, 1986 pers. com., 1988

pers. com.; Gutiérrez and Lamar, 1998 pers. com.; Martén, 1978) is representative, this species easily inflicts the most lethal bite of any known pitviper. A fatality rate of 46% (5 of 11 cases) appears to indicate humans may be uniquely susceptible to *L. stenophrys* venom. However, the severe morbidity and high mortality would not be anticipated based upon volume and toxicity of venom in the laboratory.

The lesson to be learned is that mice are not human beings. The variation in susceptibility to snake venoms makes extrapolation of LD₅₀s from one species to another an exercise in futility. Thus, the “Ten Most Venomous Snakes in the World” are not necessarily those touted by Steve Erwin on cable TV—unless you happen to be a mouse or guinea pig.

Summary

A case of fatal bite by *Lachesis* in Colombia is reported along with a literature review of venom characteristics and epidemiology of bushmaster bites. The bushmaster has historically enjoyed a reputation for serious envenoming which appears to be warranted. However, this is counterbalanced by the low incidence of reported envenomings. Further studies are needed to better correlate clinical and laboratory venom effects. For a thorough and well-written review of bushmaster envenoming see Jorge et al. (1997).

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On the Establishment of the Pacific Chorus Frog, *Pseudacris regilla* (Amphibia, Anura, Hylidae), at Ketchikan, Alaska

Dana L. Waters¹
Calif. Coop. Fishery Research Unit
Humboldt State University
Arcata, CA 95521

Thomas J. Hassler
National Biological Service
Calif. Coop. Fishery Research Unit²
Humboldt State University
Arcata, CA 95521

Bradford R. Norman³
Calif. Coop. Fishery Research Unit
Humboldt State University
Arcata, CA 95521

Abstract

The only known population of the Pacific chorus frog (*Pseudacris regilla*) occurring and breeding within Alaska was studied in 1991 and 1992. Interviews, site visits and extra-site transect surveys were conducted on Revillagigedo Island of the southeast Alaskan Alexander Archipelago to determine the distributional status of the present chorus frog population. Information available to date indicates that the population of Pacific chorus frogs inhabiting a muskeg pond system in the Ward Lake Recreation Area of Ketchikan, Alaska, was probably introduced ca. 1960. Despite field verifications of breeding activity by chorus frogs at this site in May 1992, numerous extra-site transect surveys for amphibians along the existing road system of Revillagigedo Island conducted during May and July 1992 failed to detect additional specimens or populations of *Pseudacris regilla* elsewhere on the island. The introduced population was observed to breed in 1992, 1993 and 1994; males begin calling individually or in choruses when spring temperatures begin to approach 9.5–10.0°C (ca. 49–50°F). Two vouchers, one male and one female, are preserved in ultra-cold storage awaiting electrophoretic or histological work.

Only three amphibian species (*Bufo boreas*, *Taricha granulosa* and *Pseudacris regilla*) have been verified as occurring on Revillagigedo Island in the Alexander Archipelago of Southeast Alaska (Hodge, 1976; Taylor, 1979; Waters, 1991, 1992a,b). We have determined that the Ketchikan, Alaska, population of the Pacific chorus frog was probably introduced. Previously, one of us (BN) had theorized that the frogs traveled to Ketchikan aboard a timber barge (see Chase, 1992a,b,c), similar to the way in which the clouded salamander (*Aneides ferreus*) was introduced to Vancouver Island, British Columbia (Jackman, 1993). Also, it had been theorized that the population was possibly native (Waters, 1992a).

In 1991, the Pacific chorus frogs were observed by R. Hauver (U.S. Forest Service) at the Ward Creek Recreation Area, Ketchikan, Southeast Alaska. Two live adult specimens were collected on 21 June 1991 and sent to D. Waters for identification and then forwarded to the University of Alaska, Fairbanks, for ultra-cold storage (Waters, 1991, 1992a,b).

In 1992, BN located the population during breeding choruses and gained the interest of the local newspaper, the *Ketchikan Daily News*, which published a brief article on the existence of the population and how it may have arrived (Chase, 1992). The next day, Mr. Ernest DeBoer, Ketchikan resident of more than 45 years, came forward and told the *Ketchikan Daily News* and BN that he had released the frogs as early as 1960 (Chase, 1992a,b,c; DeBoer, 1992 pers. com.).

According to Mr. DeBoer, small (<4.0 cm) and large (>4.0 cm) tadpoles, and some small transformed frogs, were

collected from Kirkland, King County, Washington (DeBoer, 1992 pers. com.). Animals were transported in a 5-gallon bucket by plane to Ketchikan with DeBoer and released by him at the exact muskeg pond system site where BN heard ca. 30 chorusing males in late May 1992.

Mr. DeBoer reported that the contents of the bucket used in transporting the introduced specimens may have included at least one other species of frog in addition to the chorus frogs. Both *Rana aurora aurora* (the northern red-legged frog), which is native to western Washington, and *Rana catesbeiana* (the bullfrog), an introduced species to western Washington, occur commonly and breed in King County, Washington. These species are sympatric with *Pseudacris regilla* in the Kirkland, Washington, area, occupy similar habitats, and breed there at approximately the same time of year (Leonard et al., 1993; BN, pers. obs.). Our own recent fieldwork and work by Ketchikan field biologists has not produced any observations of ranids on Revillagigedo Island and at this time no evidence exists that either *R. aurora* or *R. catesbeiana* has been successfully introduced to Alaska.

Dominant vegetation types at the introduction site where BN heard chorusing males in May 1992 were studied at the site and through photographs of the area. A list of the botanical species present is given in Table 1. No frogs were seen at the site by BN though several hours of effort was expended in searching out calling males. Nor were any frogs heard or observed during a 1-hour time-constrained search made by BN and E. DeBoer at the chorus site in July 1992.

1. Present address: American Express, TRCN First Floor, 19640 North 31st Avenue, Phoenix, AZ 85027.

2. The Unit is jointly supported by California Department of Fish and Game, Humboldt State University, and National Biological Service.

3. Corresponding author. Present address: 2232 Parkwood Boulevard, Eureka, CA 95503.

Table 1. Botanical taxa found to be associated with the introduction site of the Pacific chorus frog (*Pseudacris regilla*) at the Ward Creek Recreational Area, Ketchikan, Revillagigedo Island, Alaska, May and July 1992. Botanical taxonomy follows Robuck (1985) and USDA (1990).

Common name	Scientific name
Alder	<i>Alnus</i> sp.
Sphagnum moss	<i>Sphagnum</i> sp.
Yellow pond-lily	<i>Nuphar polysepalum</i>
Sedge	<i>Carex</i> sp. (Family Cyperaceae)
Sitka spruce	<i>Picea sitchensis</i>
Western hemlock	<i>Tsuga heterophylla</i>
Grasses	Family Gramineae
Yellow skunk-cabbage	<i>Lysichiton americanum</i>
Old man's beard lichen	<i>Usnea</i> sp.
Salmonberry	<i>Rubus</i> sp.
Buttercup	<i>Ranunculus</i> sp.

While at the introduction site with Mr. DeBoer in July 1992, BN verified the exact location where DeBoer claims to have made the original release of transforming frogs and tadpoles. The site was exactly where BN had heard chorusing males in May 1992. The specific information reported in paragraphs four and five above as regarding tadpole size classes and types was obtained by BN during two extended interviews in June and one extended introduction site visit with Mr. DeBoer in July 1992.

Amplexed pairs, individual frogs, and egg masses of Pacific



Figure 1. Introduction site of an established breeding non-native *Pseudacris regilla* population, Ketchikan, Ward Lake Recreation Area, Revillagigedo Island, southeast Alaska. Chorusing males were heard calling from within and throughout the Alder strip (*Alnus* sp.) and *Carex* patches shown here which are the dominant botanical species at the immediate introduction site of DeBoer ca. 1960 in the shore interface zone. Facing west from 30 m west of the parking area adjacent to road. May 1992. Photograph by B. Norman.

chorus frogs were observed at the introduction site in June 1992 by Mr. Paul Zellmer (U.S. Forest Service, Tongass National Forest). Mr. Zellmer has observed breeding activity at the introduction site in 1993 and 1994 (Zellmer, 24 January 1995 pers. com.). He insists, however, that no new localities have been verified on Revillagigedo Island since he began his seasonal observations on the population in 1992 (U.S. Forest Service, unpublished data). His more specific observations to date are: 1) the frogs are utilizing clumps of grasses (Family: Gramineae) and sedges (*Carex* sp.) for cover adjacent to the pond system margins; 2) males initiate calling as spring air temperatures approach 9.5–10.0°C (= ca. 49–50°F) at the site; 3) as darkness increases less perturbation is tolerated by calling males before they cease calling in response; and 4) both green-dominated and brown-dominated color phases of this extremely varied species of frog are present at the introduction site (Zellmer, 3 June 1992 pers. com., 24 January 1995 pers. com.). The utilization of sedges and grasses as claimed by Zellmer is consistent with the observations of BN at the site in May 1992.

The distribution of the chorus frog in southeast Alaska appears to be limited to the single muskeg pond system in the Ward Creek Recreation Area where they were originally introduced (Figures 1, 2 and 3). Forty-five extra-site transect and quadrat amphibian surveys were conducted by BN on Revillagigedo Island during May and July 1992 at 24 localities including the introduction site (Norman and Hassler 1995). No additional populations or individuals of the Pacific chorus frog were discovered during these efforts. These data seem to indicate that the chorus frog population has not significantly expanded its range on Revillagigedo Island since its introduction there.

New localities on Revillagigedo Island for the rough-skinned newt (*Taricha granulosa*) and the boreal toad (*Bufo boreas*) were discovered during the fieldwork (Hodge, 1976; Waters, 1992b; Norman and Hassler, 1995) and these will be reported on specifically elsewhere. Both of these amphibian species are native to the island but only *T. granulosa* was found sympatric with the calling male chorus frog population at the introduction



Figure 2. Same locality as in Figure 1, moving left from Figure 1, which overlaps in the right portion of this frame. Note the fairly mature spruce and hemlock stand/muskeg interface at the far end of the main pond of the introduction site pond system. May 1992. Photograph by B. Norman.

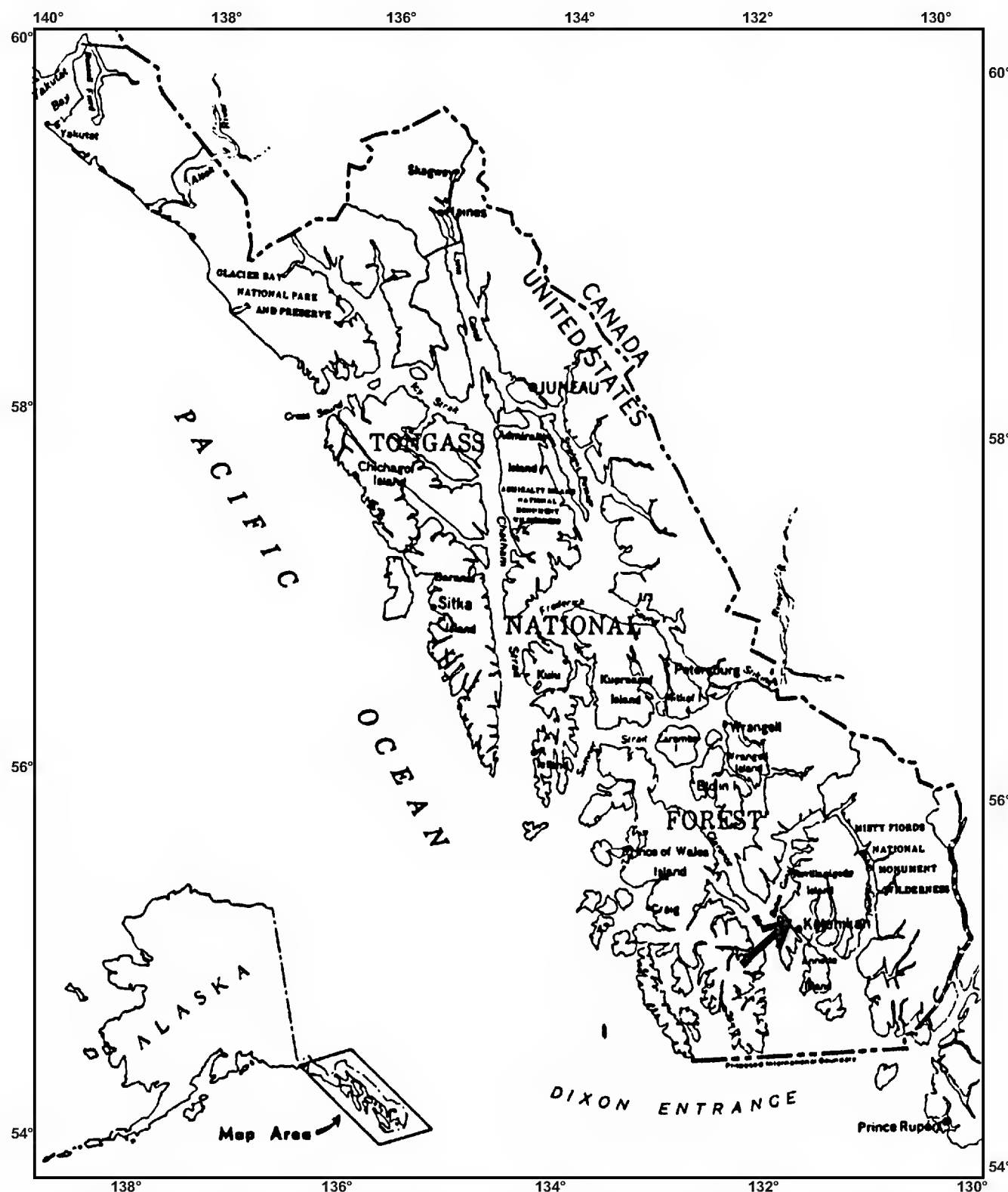


Figure 3. Map showing the location of the only known established population of *Pseudacris regilla* introduced to and breeding within the state of Alaska.

site. A recently metamorphosed newt was found under cover about 1.0 m from the chorus pond shore during the July 1992 visit, indicating that *T. granulosa* probably breeds at the site as well. Adult *T. granulosa* (females and males) in breeding condition were collected at the site during May 1992. *B. boreas* was found at a nearby Ward Lake locality and on the unpaved road bisecting the introduction site from the main Ward Lake area but not at the May 1992 chorus site per se (Norman and Hassler, 1995).

In studying Pacific chorus frogs in Oregon, Jameson (1956) determined that most juveniles were found to disperse <200 yards from one rearing pond. It would be interesting to study whether or not similar dispersal patterns are in operation at the introduction site. Perhaps selective pressures limiting dispersal have resulted in an extremely limited insular distribution for this usually ubiquitously occurring taxon which inhabits all available and varied habitats within its range in the lower western United States and British Columbia, Canada (Stebbins, 1985; Leonard et al., 1993).

We invite interested workers to genetically compare *Pseud-*

acris from Kirkland, Washington, and from Ketchikan, Alaska. Two specimens have been collected from Ketchikan and are stored at the University of Alaska, Fairbanks, Museum. Please refer to Waters (1992a) for locality and museum information. In addition, further research into the impacts this introduction is presently exhibiting on the native amphibian populations of Revillagigedo Island, if any, is strongly encouraged.

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HerPET-POURRI

by Ellin Beltz

First the frogs, then the rest of us

The April 21 *Washington Post* reported that a Louis Harris poll of 400 scientists from the American Institute of Biological Scientists ranked extinction of species as one of the planet's gravest concerns. "The speed at which species are being lost is much faster than any we've seen in the past—including those [extinctions] related to meteor collisions, said [a] University of Tennessee ecologist. Most Americans are unaware that the rate of present-day extinction of plants and animals is greater than during any other known extinction event in the past. [*GREENLines* #610, April 21, 1998, from Roger Featherstone <rfeather@defenders.org>]

Tale of two CITES . . .

- U.S. Department of Justice—United States Attorney, Southern District of Florida, February 3, 1998, News Release: One of the nation's largest reptile import companies, Hollywood, Florida-based Strictly Reptiles Inc., yesterday had its export-import license revoked for five years for smuggling more than 1,500 rare reptiles into the United States, the federal government announced. In July 1997, the company and its owner pled guilty to charges of conspiring to violate the Lacey Act, a federal law that protects endangered wildlife, by purchasing Indonesian reptiles between 1993 and 1995. Yesterday, the U.S. Fish and Wildlife Service revoked the company's license in connection with the plea. The company's owner and President, Michael J. Van Nostrand, is currently serving an eight-month prison sentence followed by eight months of home confinement as part of his guilty plea. Under the plea agreement, Van Nostrand also had to pay nearly \$250,000 to the World Wildlife Fund to implement a government-supervised restitutionary program to protect specific habitat in Indonesia that is home to the very creatures that were illegally trapped and smuggled. Additionally, the agreement bars the company and its owner from trading, selling or handling any endangered or threatened wildlife, as well as, certain species specifically identified in the agreement for five years. "This case shows that those who rob a nation of its rare and endangered wildlife out of personal greed will be brought to justice," said Lois Schiffer, Assistant Attorney General in charge of the Justice Department's Environment and Natural Resources Division. "Trafficking in endangered wildlife is prohibited under U.S. law and international treaty, and will not be tolerated." Thomas E. Scott, United States Attorney for the Southern District of Florida, where the case was prosecuted, said "this case represents the finest in international environmental enforcement: cooperation among enforcement agencies to protect irreplaceable species, effective and timely punishment of the violators of conservation laws, and a creative effort to mitigate the harm from the criminal conduct. I commend the agents, both here and abroad, who contributed to this resounding success." Van Nostrand and his company conspired to purchase frilled dragons and Fly River turtles they knew were exported in violation of Indonesian law. Van Nostrand and his company also pled guilty to purchasing Argentinean reptiles, including Argentine boas, Chaco tor-

toises, rainbow boas, red-footed tortoises, tegu lizards, and yellow-spotted Amazon turtles, all of which they knew were smuggled into the country in violation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), an international treaty designed to protect wildlife from overexploitation. The Indonesian chapter of the World Wildlife Fund will be responsible for operating the restitutionary program, which will focus on initiating, expanding, improving and maintaining wildlife projects in the Lorentz Strict Nature Reserve located on Irian Jaya—the Indonesian portion of the Island of New Guinea. The Lorentz reserve is home to the frilled dragon and the Fly River turtle and other protected species often imported by Strictly Reptiles. Because all Indonesian national parks and nature reserves suffer from funding shortages, the restitutionary funds will be used for practical programs such as training and certifying park guards and conservation bureau staff, providing critical equipment, and setting up "mobile awareness teams" to work with communities near the project sites to increase awareness about habitat protection and the illegality of poaching reptiles and other species. A portion of the funds also will be used to help communities, which often depend upon the income from wildlife poaching, to develop alternative means of earning money which are consistent with conservation goals. The investigation was conducted with the cooperation of authorities in the Netherlands, including the Netherlands National Police and the District Office of the Public Prosecutor at Breda. The Netherlands National Police helped spur the investigation by providing the U.S. Fish and Wildlife Service with audiotapes from electronic surveillance of Dutch reptile dealers revealing that protected Indonesian reptiles were being laundered through the Netherlands and shipped to Strictly Reptiles Inc., falsely labeled as captive bred to give them the appearance of lawful imports. [from Bruce J. Weissgold <E-mail: Bruce_Weissgold@fws.gov>, February 6, 1998, forwarded by Steve Grenard and James N. Stuart]

- "A Sierra Club press release condemned a World Trade Organization [WTO] ruling against a U.S. ban on the sale of shrimp caught without endangered sea turtle protection. To reduce the number of sea turtles killed while catching shrimp, the United States Endangered Species Act [USESA] requires shrimp sold in the U.S. be caught using Turtle Excluder Devices [TEDs] . . . [which] could save 97% of the 150,000 sea turtles killed in shrimp nets each year. Malaysia, Thailand, India, and Pakistan challenged the USESA through the WTO. 'Three unaccountable trade bureaucrats sitting behind closed doors in Geneva should not have the power to make up rules that sabotage global environmental protection,' said Carl Pope of the Sierra Club. 'Americans will not submit to the unaccountable power of the World Trade Organization.' [*GREENLines* #584, March 17, 1998, from Roger Featherstone <rfeather@defenders.org>] Newspapers covered this story from sea to sea and even overseas. Thanks to Ernie Liner, Alan Rigerman, P. L. Beltz and Herp Haven for other copies!

- A scary 523 dead sea turtles of all species washed up on

Texas beaches last year. Of the total, 180 were Kemp's ridleys; 21 of these were adult. Sea turtle strandings dropped 90% during the eight weeks shrimp fishing closure from May 15 to July 15. [*Naples Daily News*, March 21, 1998, from Alan Rigerman]

But what happened to the animals?

"A federal judge in Miami showed leniency in sentencing a Slovenian caught smuggling . . . 49 Hermann's tortoises into the United States. . . . [The] public defender . . . argued that the tortoises had been bred in captivity and were not, technically, wildlife. . . . [The man] was sentenced to two year's probation that can be served in his home country." He could have gotten five years in jail. [*Miami Herald*, March 29, 1998, from Alan Rigerman]

Babe is blue, but salamanders smile

"Associated Press reported [that] California gubernatorial candidate Lieutenant Gov. Gray Davis says he would ban old-growth logging. Davis told the Planning and Conservation League Foundation he would ensure 'wetlands are preserved, rivers are clean, and all old-growth trees are spared from the lumberjack's ax.'" [*GREENLines* #584, March 17, 1998, from Roger Featherstone <rfeather@defenders.org>]

The last word on the Wisconsin Conference

"About 300 people attended the two day Midwest Declining Amphibians Conference in Milwaukee, Wisconsin, hosted by the Milwaukee Public Museum on March 20-21, 1998. This was a joint meeting of the Central and Great Lakes Division Working Groups of the Declining Amphibian Populations Task Force. The conference was organized by Gary Casper, chair of the Great Lakes Working Group, with assistance from Christopher Phillips (chair of the Central Division Working Group), and Michael Lannoo (U.S. DAPTF Coordinator). There were 42 papers presented, and a panel discussion on amphibian malformities. Topics included survey and monitoring reports, population biology and ecology, and malformity causes and statistics. Abstracts are available through the Great Lakes Declining Amphibians website at <<http://www.mpm.edu/collect/vertzo/herp/Daptf/daptf.html>>. Publication of a proceedings is being investigated. The new research presented by scientists investigating potential causes of frog deformities attracted national attention, including network television. There is increasing evidence implicating pesticides as causal agents, with retinoids or retinoid-like compounds suspect. The evidence now suggests that of the three leading hypotheses, chemical contaminants should now be considered the most likely (more so than either parasites or UV light). . . . Reporters and camera crews from NBC Nightly News (Chicago), ABC (New York), National Public Radio (WUWM), *Outdoor Wisconsin*, the *Green Bay Press-Gazette*, the *Minneapolis Star Tribune*, the *Milwaukee Journal Sentinel*,...the *Washington Post* . . . [and] CNN attended. The mix of scientists, natural resource managers, and students attending came from as far away as Maryland, California and Guatemala. Participating agencies included seven state DNRs, the U.S. Environmental Protection Agency, the Minnesota Pollution Control Agency, the Illinois Natural History Survey, the U.S. Geological Sur-

vey, the Salk Institute, many universities and colleges, the Nature Conservancy, the National Wildlife Health Center, the U.S. Fish and Wildlife Service, the Pacific Northwest National Laboratory, the Patuxent Wildlife Research Center, the National Institute of Environmental Health Sciences, and the Northern Prairie Wildlife Research Center." [from Gary S. Casper, Vertebrate Zoology Section, Milwaukee Public Museum, <gsc@uwm.edu> April 29, 1998].

Timber rattlers protected in Wisconsin

Rattlesnakes get a bum deal. Harvested, blasted out of dens, killed on sight, collected for science and venom extractions—it's no wonder they're on the decline and need protection. The newest state to join the ranks of the brave and protect this symbol of earliest patriotism is Wisconsin which officially listed it as a "Protected Wild Animal" as of April 1, 1998. "This designation . . . [makes] collecting, killing or possessing the rattler illegal except in situations involving an immediate threat to people, pets or livestock." [*Tomah Monitor Herald*, April 13, 1998, from Tom Zaremba]

Paradise lost

From Robert W. Hansen, editor of *Herpetological Review* (SSAR): "For those of you planning on flying for fun or field work this summer, watch out for those airport X-ray machines!. . . . New 'film-killer X-ray' security equipment being used in [some] airports . . . destroys film, exposed and otherwise. . . . [The] new equipment is InVision Technologies CTX-5000 baggage scanner . . . \$900,000 each. . . . An InVision official acknowledged that the 'rate of scanned films that are damaged is 100 percent.' Apparently David Attenborough and crew found out this was too true. He and a BBC film crew spent five weeks in New Guinea filming on location and passed through the Manchester airport and lost everything. . . . Three options (1) insist on having your film hand inspected, (2) buy your film when you get there... (3) [find a shipper] who will guarantee no X-raying. . . . These new X-ray machines are programmed to respond to anything mysterious [like a lead-lined film bag] by rescanning just that area with a high power narrow beam CAT scan which will penetrate anything, so the lead bag guarantees your film is ruined [For security reasons] the FAA will not give out the list of the airports with these new X-rayers. . . ." [from Bill Love; and March 14, 1998 *Democrat-Gazette*, Little Rock AR, from Bill Burnett]

Lizards zap Lyme disease

Ever wonder why Lyme disease is such a big thing in the east and no real problem in the west? Researchers found that the host cycle in each place was different. Out east, it's the white-footed mouse in which Lyme disease bacteria multiply until sucked up by a tick and passed along to the next meal. In the west, however, it's the common western fence lizard that provides the tic-cafeteria; and something in the lizards' blood is killing the bacteria. [April 19, 1998, *Courier Journal*, Louisville KY, from Gary H. Kettring and *Democrat-Gazette*, Little Rock AR, from Bill Burnett]

Miscellaneous things

- Genetic engineers at the University of California, San Diego, announced that they had introduced foreign genes from a fluorescent jellyfish protein into African clawed toads. Frogs are preferred subjects for this kind of transgenic work because of their large eggs and embryos. And, one researcher pointed out that they're cheaper than mice. Researchers noted that the process worked right up to the tadpole stage. The tadpole does not glow in the dark, but the fluorescence can be seen under the microscope in the cells. [Reuters, February 26, 1998, from Kimberley and Wes von Papineäu]
- Back in February, a teenage girl was mauled by a crocodile along a storm-water drain in Brisbane, Australia. Now a six-foot-long crocodile has been spotted in this antipodean suburbia. It was seen sunning on the banks and fled after a man threw a rock at it. [Times Standard, Eureka, CA April 20, 1998, from Bradford Norman]
- The director of the Polish Academy of Sciences announced that scientists are studying a lizard which was preserved in Baltic amber for 40 million years. It is only the second Baltic lizard ever to be found. The first was found by a Gdansk jeweler who gave it to the museum. [Fox News Network, February 3, 1998, from Kimberley and Wes von Papineäu]
- Read the ridley turtles' newsletter on HEART's new web page <<http://www.ridleyturtles.org>> or more information snailmail from Box 681231, Houston, TX 77268-1231.
- Volunteer for any of three sea turtle research projects this fall with Earthwatch. Contact them at <info@earthwatch.org> or <www.earthwatch.org> or phone (617) 926-8200.
- A woman from Germantown, Maryland, wrote the *Chicago Tribune*: "Last year I wrote to the Museum of Science and Industry regarding the museum's hatchery exhibit. I was referred to the Lincoln Park Zoo in response to my inquiry about the disposition of [the Museum exhibit] chicks. . . . The zoo's general curator . . . [wrote] that the majority of the chicks are fed to the collection's reptiles. . . . Nothing is said [in the exhibit] about the eventual destination of these birds. . . . The hatchery exhibit misleads the public to think that chickens do not have mothers or the need of a family life. It is a desensitizing display that should be eliminated." [May 4, 1998, from Ray Boldt]
- If ignorance is bliss, why aren't there more happy people? [Bumper sticker in NEIU parking lot May 2, 1998, at ReptileFest]

Are they alive? What do they eat?

We were trying to think what you give highly successful ReptileFest co-chairs Lori King-Nava and Gary Fogel. Hugs? Hisses? A round of two-handed clapping? A month recovery? Free tickets to a psychiatrist if they start talking about "next year?" An original Don Wheeler tattoo? If you were there you saw the fabulous spaces, displays, layout, petting area, Klingon security (hey, like no problem, dude you know), photo booth with python, membership, giant crocodile, white crocodilian, zillions of fruit flies, waxworms and crickets,

iguana trees and cages, turtle petting pens, wild frogs, odd lizards, placid turtles, green iguanas, and snakes everywhere. If you weren't there — you missed it. See you at the next one?

Thanks to everyone who contributed to this month's column and thanks to all the CHS members who stopped by at ReptileFest to say "hi" including John Levell, daughter Jenny with his new granddaughter (how time flies!), Bob Bavirsha, Steve Barten, Ben Entwistle, Jack Schoenfelder, Ron and Dottie Humbert, Lori King-Nava and Gary Fogel, Jim Nesci, Ilene Sievert, George and Sara Richard, Gino Martinez, Bob Applegate, Larry Marshall, Dave Bishop, Audrey Vanderlinden, Don Wheeler, Gary Kostka, Brian Jones, Mike Dloogatch and Kimberley Smith. Don't forget to send clippings with date/publication slug (or whole pages of newspapers) to me for future columns! Ellin Beltz, 1647 N. Clybourn Avenue, Chicago, IL 60614-5507. Letters only to my E-mail <ebeltz@ripco.com>. What happened to my E-mail, to answer one contributor, is that my school canceled all alumni accounts, so I had to go get a private account and the address changed. Why I can't load files is a post-crash software problem — so please, just letters electronically! Thanks.

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Bill & Marcia Brant
6115 SW 137th Avenue
Archer, FL 32618
(352) 495-9024
FAX (352) 495-9781
e-mail: GrmtRodent@aol.com
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Currently Happening Stuff

That was the week that was . . .

What follows are brief glimpses into some of the activities that occurred during the week prior to ReptileFest '98.

Saturday, April 25 . . .

It's 6:00 P.M., and ReptileFest Coordinator Lori King-Nava and yours truly are seated side by side in a WGN Radio studio located on the main floor of the Chicago Tribune building. We're scheduled as guests on Steve Dale's "Pet Central," a weekly two-hour radio program featuring guests and information geared toward pet owners and animal enthusiasts. It's 15 minutes until we're due to go on, so we've got a chance to get accustomed to our surroundings and gain a feel for the show as we listen to Steve conduct a telephone interview with his first guest of the evening.

At 6:15 P.M. we hit the airwaves as Steve introduces Lori and me. He starts things off by allowing Lori to take advantage of WGN's 50,000 watts of transmitting muscle to promote the upcoming ReptileFest. Lori, fully aware of the untold thousands of potential show-goers who are listening, rises to the occasion and plugs the 'Fest with a style and panache that make it seem as though she does this sort of thing every day of her life. For the next 45 minutes we get a chance to talk herps with our host and respond to a number of calls from listeners on topics ranging from fear of snakes to what to do for an ailing White's treefrog. Complimentary ReptileFest passes are offered to all who phone in and most callers eagerly accept. Those who suffer from irreversible cases of ophidiophobia gladly opt for other gifts provided by the nice folks at WGN.

It's all over too soon, and at seven o'clock we bid a fond farewell to Steve Dale and his gracious staff as we make our way outside into the cool air of a beautiful spring evening in Chicago. Lori and I discuss the broadcast, the CHS and 'Fest '98 over dinner at a local restaurant followed by coffee at one of those trendy coffee shops. Whether it's the residual excitement of our on air experience or the buzz from the caffeine, I can't be sure, but we're both feeling energized and we prattle on 'til almost midnight. The 'Fest is only six days away and momentum is building. We can only hope that all the planning and effort will pay off.

Sunday, April 26 . . .

There's no rest for the weary, and Lori's right back at it bright and early the next day doing a 7:00 A.M. telephone interview with Paul Johnson of WJKL radio. Paul is the host of Focus Northwest, a program featuring items of interest to people in the Northwest suburban area of Chicago. Delayed half an hour because of technical problems, Lori patiently remains on the line and the interview finally commences at 7:30 and runs until 8:00 A.M. Lori and Paul strike up an

immediate rapport as Lori answers his questions regarding the CHS, ReptileFest and the current state of herpetoculture. Paul is surprised when Lori informs him that there are nearly as many women in the Society as there are men. He's also intrigued by Lori's description of the great degree of love

and devotion which herp owners often develop toward their cold-blooded charges.

Wednesday, April 29 . . .

The business portion of the April general meeting of the CHS focuses primarily on ReptileFest, which is looming ever larger on the horizon. With less than 48 hours until set-up begins on Friday, show coordinators Lori King-Nava and Gary Fogel step up to the podium for one last chance at fanning the flames of 'Fest enthusiasm. Their glassy-eyed countenances and frenzied demeanors bear testament to the innumerable hours of intense effort that each has invested in the pursuit of their shared vision. They conclude their update by showing a three-minute video montage containing scenes from the past four 'Fests. Copies of the tape have been included in the ReptileFest '98 press kits that have been sent to local media outlets. Seamlessly edited by member Phil Drajeste, the video snippets are accompanied by the dulcet tones of Betty Grable singing "Snake Dance," a sinuous, toe-tapping tune from the 1934 MGM musical "Student Tour." The heartwarming comedic charm of the tape has a palpable effect on the audience. I can't help but feel that we're on the verge of something truly wonderful this year.

California Dreamin' . . .

Introduced by Mike Dloogatch as one of the founders of the current trend in herptile captive breeding, featured speaker Bob Applegate entertained and enlightened those at the April 29 general meeting of the CHS. His presentation covered roughly 30 years of his involvement in herpetoculture as a keeper and breeder of snakes and helodermatid lizards. Bob has come a long way from his modest beginnings with a collection of unrelated snakes kept in glass aquaria in the modified garage of his first home in San Diego. He now occupies a position as one of the premier breeders of colubrids and heloderms in the herpetocultural business. Along the way he's learned a lot and he's always been more than willing to share his knowledge with his fellow herp enthusiasts. His magnanimous spirit sets him apart from many of his counterparts in the herp-breeding business who tend to hoard information as if it were gold, lest they give a would-be competitor a leg-up in the marketplace.

As I sat back and enjoyed the presentation, I got the feeling that I was watching a slide show not so much about the husbandry and breeding of snakes and lizards, but about the fasci-

nating life of an individual who just happened to share my interest in herps. Bob's easygoing, affable nature shone through as he deftly wove numerous amusing anecdotes into the fabric of his information-packed talk.

Slides of the animals with which Bob has chosen to work were breathtaking and included a wide variety of tricolored kingsnakes and other colubrids as well as an assortment of Gila monsters and beaded lizards. Bob also included slides and descriptions of the various habitats in which these animals occur and into which he sometimes ventures on collecting trips. Details from some of these trips were especially amusing including an incident which occurred in the Mexican desert involving a case of Montezuma's Revenge, a lack of toilet paper and nothing but cactus for as far as the eye could see. I'll leave the rest to your imagination, just as Bob was considerate enough to do with us.

Also of great interest were the descriptions and pictures of Bob's recently completed home in Campo, California, which includes separate buildings designed specifically for housing his snakes, Gilas and beaded lizards and the rodent colonies required to feed them. The snake building features north-facing windows integrated into the structure of the roof, which allow natural light in without exposing the interior to the direct rays of the sun. The walls of the facility are buried in the ground on three sides to help compensate for the extremes of the Southern California climate where temperatures can range from over 100 degrees during the day to below freezing at night. Inside, the facility is equipped with custom-built cages which can be interconnected to allow the snakes the ability to move about and get exercise as well as to provide a more natural environment for breeding.

The heloderms will also be receiving the benefits of Bob's farsighted approach to husbandry, as he intends to construct a screened outdoor enclosure attached directly to their building which will allow them to move outside whenever they choose.

Feeder rodents live out their days in an environmentally controlled facility featuring automated food and watering systems. This set up enables Bob to completely service the animals in just two hours on a weekly basis.

I had the pleasure of becoming better acquainted with Bob Applegate and his lovely wife Marilee at the post-meeting gathering of CHS members that typically takes place at the Giordano's restaurant located at the corner of Halsted and Van Buren. I was pleased to learn that the Applegates would be staying in town through the weekend as guests of Ron and Dottie Humbert and that they would both be on hand to help out at ReptileFest. As we all noshed on pizza and the conversation flowed, I got the warm feeling that the Applegates were doing their best to make us feel comfortable with them, even though it was they who were our guests.

Thursday, April 30 . . .

We're really down to crunch time now. Heaven only knows what Lori King-Nava and Gary Fogel must be going through at this time. All I know is that it's nearly 9:00 P.M. and Ron Humbert is scheduled to appear on the "Sports Page"

program on CLTV in order to promote ReptileFest. Much to my dismay, I find that my cable company does not provide CLTV, so I quickly dial up my mother (she subscribes to a different cable company) and enlist her services in videotaping the telecast for me. It's not often that a member of the CHS gets to appear on TV and I'll be darned if I'm going to miss it. I race over to my mother's house immediately following the broadcast to retrieve the tape, returning home to watch it as I continue with my own preparations for 'Fest.

Ron spends nearly an hour as a guest on CLTV's "Sports Page," a program that features scores and highlights from the world of sports as well as information for outdoor sporting enthusiasts. He displays and describes a variety of herps as he chats with the show's two principals, a comely woman named Jill who hosts the show and handles the sports-reporting duties and a jovial, slightly rotund guy by the name of Chauncey who does a running segment within the show called "The Great Outdoors." Jill is admittedly a reluctant participant in the herptile proceedings, but Chauncey's enthusiasm is unbridled as he eagerly reaches out for each and every animal as quickly as Ron can remove it from its bag or container. Viewers are invited to call in with questions during the course of the show, but the only query directed to Ron concerns the risk of contracting salmonella from wild-caught frogs and turtles. The remaining callers are interested only in tapping into Chauncey's vast reservoir of knowledge concerning the regional fishing scene.

Without a doubt, Ron's appearance on CLTV's "Sports Page" provided the CHS and ReptileFest with a tremendous amount of exposure as well as providing viewers with 50 minutes of some of the most unusual programming that they're ever likely to see. Thanks to the folks at CLTV for having us and thanks to Jill and Chauncey for their wholehearted promotion of the 'Fest during their show.

Friday, May 1 . . .

Arriving at Northeastern Illinois University's Alumni Hall at 6:00 P.M., I walk in on a beehive of frenzied activity. Those on hand for show set-up struggle with the daunting task of transforming this large exhibition hall into a showplace worthy of ReptileFest. Most have been working since 1:00 P.M. under the capable direction of Lori King-Nava and Gary Fogel. Both Lori and Gary are under a constant state of siege, answering the myriad questions which inevitably arise and making the hundreds of decisions necessary to keep the "ReptileFest Express" on track.

Assisted by my son John, I begin assembling the python pen in the central part of the room. Mike Dloogatch and Bob Applegate labor above us, busily engaged in the task of suspending six gargantuan inflatable dart poison frogs (on loan from the Shedd Aquarium) from an overhead loft which borders the hall on two sides. Jenny Picciola and Char Haguewood are hard at work setting up the Iguana Squad's substantial exhibit area, which will contain an impressive array of animals along with numerous informational displays describing the captive husbandry and natural history of a wide variety of iguanids. Dottie Humbert, Marilee Applegate and Mr. and Mrs. Picciola work like well-oiled machines as they move

about the exhibit hall adding skirts to the tremendous number of six-foot tables required to accommodate the 55 exhibitors and 14 vendors who will take part in the show. The teal and white tablecloths they're using go a long way towards brightening up the austere decor of the hall. Ron Humbert assumes the duties of a city planner as he tackles the logistical problems of determining the locations for each of the exhibitors and vendors within the hall and its adjoining lobby area.

Speaking of the lobby, things are hopping out there as well. Jenny Vollman diligently works to construct the famous CHS turtle pen as Bob Bavirsha and son Dan apply their considerable energies and expertise to a multiplicity of tasks ranging from hauling equipment to constructing the jungle backdrop for the photo booth to running extensive amounts of electrical cable. They've also supplied and set up the whimsical stand-up dragon and palm trees which are the first things that 'Fest visitors will see as they enter Alumni Hall over the course of the next two days.

At 10:00 P.M. we're required to vacate the premises at the behest of Northeastern's security staff. We all share our hopes for a successful show as we bid each other farewell before heading back to our homes for some much needed sleep. The last words that I hear Lori King-Nava utter as we walk out the door are "I wish we had just one more hour. . . ."

ReptileFest '98 . . .

If you weren't there you should've been. If you were there, you'll have to agree that ReptileFest '98 was one Helluva show and a fantastic success in every respect. From attendance figures to vendor sales to photo and tattoo booth proceeds to new members recruited, every mark from the previous four 'Fests was eclipsed by this year's totals. Member participation was the greatest ever with 55 exhibitors displaying a tremendous assortment of animals in some of the most beautiful and imaginative displays yet seen. Fourteen vendors plied a diverse selection of herp-related wares which included live food (crickets, mealworms, etc.), books, cages and cage furniture, custom printed T-shirts, prepared skeletons (reptiles of course), jewelry and objets d'art just to name a few.

Entering the main hall from the lobby, the Iguana Squad's

elaborate exhibit was the first thing to catch one's eye. Green iguanas were perched on several upright trees located around the periphery of the exhibit area commanding the attention of all who passed below. Chuckwallas and rhinoceros iguanas were also on display, representative of some of the lesser-known iguanid species. Education was high on the Squad's priority list, so plenty of information on topics ranging from green iguana husbandry to the endangered status of several species of rock iguanas found only on certain Caribbean islands was made available to the public. Beanie Baby iguanas were offered for sale, with all proceeds going to the International Iguana Society. I'm proud to say that the Squad was able to contribute \$1,500 to the IIS, all of which has been earmarked for further research on the critically endangered rock iguanas of Booby Cay.

The Iguana Squad is the brainchild of Lori King-Nava and was conceived shortly after she attended a round-table discussion concerning the plight of the green iguana held at last year's Midwest Herp Symposium hosted by the Minnesota Herp Society. George and Sarah Richard of the MHS were on hand to help the Iguana Squad in its efforts to raise public awareness as to the problems currently confronting the green iguana. It is Lori's hope that other Midwestern regional herp societies will be able to work in conjunction with the CHS and the Iguana Squad at future 'Fests in a cooperative effort to improve the fate of these noble lizards.

Moving along, one encountered a number of large varanids on display in custom enclosures built especially for ReptileFest by CHS member "Iggy" Ihrig. Sturdily constructed with wooden frames and covered on sides and top with a double layer of heavy-duty plastic mesh, the king-sized cages served as a graphic example of just how much space is actually necessary to adequately house these large lizards. Finished in white, the framework of the cages contrasted sharply with the black mesh that "Iggy" had utilized, making for a striking visual impact. In fact, the enclosures looked more like furniture than cages.

'Fest attendees who had ailing herps at home could have their medical queries answered by either of two vets who were manning the "Ask the Vet" booth. Throughout the weekend, Drs. Byron DeLaNavarre and John Bruederle graciously dis-



Gino Martinez's bluetongue skink helped attract visitors to the membership table. Photograph by Gary Fogel.



Iguana squad stalwarts Char Haguewood, Lori King-Nava and Jennie Picciola, holding some of their charges. Photograph by Gary Fogel.

pensed their advise to all those who solicited it, making many new friends for the Society in the process. Both men are members of the CHS, and the generous donation of their time and expertise to this year's ReptileFest was greatly appreciated.

The Chicago Academy of Sciences, with which the CHS is affiliated, was also represented at the 'Fest courtesy of Kira Berman. We're all anxiously awaiting the grand opening of their new facility near Lincoln Park in the Spring of '99, and were delighted to have them participate in this year's show.

The tattoo booth was once again one of the most popular attractions at the show and a major producer of revenue. Artists Don Wheeler, Ellin Beltz and Kim Smith barely had time to put their markers down judging from the number of kids and adults strolling about sporting colorful images of snakes, scorpions and assorted other creatures on various parts of their bodies.

Attendees had the opportunity to bring home a photographic memento of their visit to ReptileFest if they so chose. For a small fee, they could have their picture taken as they held a giant snake (or in some cases as it held them) in front of an elaborate backdrop of jungle foliage and ancient temple ruins. Ben Entwisle handled the photographic responsibilities while Bob Hilger, Jenny Vollman, Eric Spitzer and John Kostka served as snake wranglers. Steve Quint and Bob Hilger respectively provided the photogenic and well-mannered Burmese python and Colombian boa that helped attract a record number of visitors to the booth.

Lest we forget the educational aims of the 'Fest in all this talk of monies earned, I'd like to throw in a word of praise for the efforts of those involved in the highly popular Children's Pet and Learn Sessions. These mini seminars held at regular intervals throughout the two days of the show featured individ-

ual members talking to groups of kids about a specific reptile or amphibian. The sessions were held in a second-floor room away from the crowds, and the kids were encouraged to ask questions and handle the animals. As veteran herpers we sometimes tend to become a little bit jaded about the animals we see so frequently, but all it takes is the wide-eyed wonder of a little child touching a corn snake or a leopard gecko for the first time to rekindle that same sense of fascination within ourselves. Pet and Learn were first established at last year's 'Fest and in just one year they have developed into one of the more eagerly anticipated features of the show.

Finally, I must not forget to mention all the exhibitors with their marvelous animals, who really made ReptileFest '98 the herp happening of the year. As I stated earlier, more members and species were represented at this year's 'Fest than ever before. The call for member participation began back in the January issue of the *Bulletin* and your response over the course of the succeeding months was phenomenal. I wish that I could mention every member who took part by name along with each animal exhibited, but that would be far too difficult a task. Suffice to say, you each played a significant part in making this event the success that it was. Your patience and kindness in dealing with the guests was mirrored in their smiles of enjoyment.

Special thanks go out to each and every member of the ReptileFest planning committee, without whom this magical event could never have taken place. Most people see the 'Fest as just a weekend event, but for the few individuals who actually take part in its planning and implementation it takes the better part of a year. I'd mention all of your names, but you all know who you are and I'm sure that after a couple months' rest, the same faces will be regrouping to start the entire process over again for 'Fest '99.

Extra special thanks go out to Bob Petty of ABC channel 7, whose live telecast from ReptileFest prior to Sunday morning's opening had a tremendous effect on boosting our attendance. Thanks also to whomever it was at the *Chicago Tribune* that decided to give the 'Fest a huge mention in the Friday weekend events section. Once again, it's hard to estimate just how many people came through the door as a direct result of these tremendous bits of free publicity, but I'm sure the number was significant.

Heartfelt thanks to Ron and Dottie Humbert who gave freely of their time and energy and also opened their home to Bob and Marilee Applegate while they were in town. Thanks to the Applegates for their kindness and selfless efforts in helping the CHS pull off this colossal undertaking. You didn't have to do it, but you did, and we're forever in your debt. By the way, Dottie asked me to mention that she genuinely enjoyed having you both as guests in her home.

To Lori and Gary, your vision for ReptileFest '98 was more than fulfilled. What an unbelievable accomplishment for both of you! Thank you both from the bottom of our collective heart.

Thanks for your indulgence. See you next month.



Bob Ryan poses with his boa constrictor. Hanging from the balcony in the background are two of the giant inflatable frogs graciously loaned to us by the Shedd Aquarium. Photograph by Audrey Vanderlinden.

Herpetology 1998

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

ANTI-LYME DISEASE FACTOR IN THE BLOOD OF THE WESTERN FENCE LIZARD

R. S. Lane and G. B. Quistad [1998, J. Parasitology 84(1): 29-34] note that nymphs of the western black-legged tick, *Ixodes pacificus*, contain 3-4 times as many Lyme disease spirochetes, *Borrelia burgdorferi*, as do adult ticks. The western fence lizard, *Sceloporus occidentalis*, is a primary host of western black-legged tick nymphs. The authors investigated whether the spirochetes were lost due to some anti-spirochete factor in the blood of the lizards, or whether they were lost during the nymphs' molt to the adult stage. Five fence lizards were vaccinated with heat-killed *B. burgdorferi* and five more lizards were tested and found to lack anti-borrelia antibodies (i.e., to lack immunity against *B. burgdorferi*). Each of the 10 lizards was exposed to 10 tick nymphs infected with *B. burgdorferi*. Sixty-two adult ticks were recovered after these nymphs fed and molted, and none of them contained spirochetes. This compared to adult ticks from infected nymphs which had fed on rabbits immune to *B. burgdorferi*, 11 out of 20 (55%) of which contained spirochetes. These results indicate that neither host immunity nor the process of molting remove *B. burgdorferi* from infected nymphal ticks. Further testing showed that spirochetes placed in plasma from lizards died within one hour, while those placed in mouse plasma lived for 72 hours. When the lizard plasma was heated and cooled, spirochetes placed in it survived for 72 hours. The authors conclude that the blood of western fence lizards contains a heat-sensitive, anti-borrelia factor, probably a protein, which kills spirochetes in feeding western black-legged tick nymphs.

STREAM-DWELLING AMERICAN TOAD LARVAE

J. R. Holomuzki [1997, Herpetologica 53(4):445-453] examined the relative performance of larval American toads (*Bufo americanus*) inhabiting different habitats (isolated pools and the main channel) of an intermittent third-order stream in west-central Kentucky. Larval mortality was 100% in six of eight isolated pools because of habitat drying; mortality was ~98% in each of the two longer lasting pools. None of the cohorts tracked in the main channel died from desiccation. Density effects on larval diets and lifehistory traits also varied between habitats. Algal (food) standing crops were significantly negatively correlated with larval densities in isolated pools but not in the main channel. As epilithic chlorophyll *a* concentrations decreased in isolated pools, larvae proportionally included more detritus in their diets. Associated with these patterns, larvae inhabiting isolated pools metamorphosed at a significantly smaller size than those in the main channel. These results suggest that intraspecific competition for periphyton is more likely to occur in isolated pools than in the main channel. Between-habitat variation in larval performance may have major effects on the dynamics of natural toad populations.

LEOPARD GECKO RESPONSES TO PHEROMONES

L. J. Steele and W. E. Cooper, Jr., [1997, Herpetologica 53(4):475-484] investigated the abilities of males and females of *Eublepharis macularius* to discriminate between their own pheromones and those of same-sex conspecifics and of males to distinguish between female cagemates and unfamiliar females. Tongue-flicks and other behaviors in response to pheromonal stimuli were recorded for 5 min. Tongue-flicks by all males to their own stimuli and to those of another male did not differ significantly, but some males performed aggressive stilted displays to stimuli from other males, reducing the time available for tongue-flicking. When males that stilted were excluded, the tongue-flicking rate was significantly higher in response to chemical stimuli of unfamiliar males than to their own. In an alternative analysis, a tongue-flick stilt score, a composite measure weighting aggressive responses more heavily than tongue-flicking, also was significantly greater in response to stimuli of other males than to the males' own stimuli. Three behaviors revealed differential response by males to chemical stimuli from female cagemates and unfamiliar females. Chemical stimuli from unfamiliar females elicited significantly greater tongue-flick rate, a higher probability of performing tail vibration, which is a species-typical courtship behavior, and a higher probability of remaining with the pheromone source throughout a trial. Tongue-flick rates by females did not differ significantly in response to their own pheromones and those of other females. Neither were there other behavioral indications of discrimination.

TIGER SALAMANDER HABITAT USE

D. M. Madison and L. Farrand III [1998, Copeia (2):402-410] tracked 27 adult radio-implanted *Ambystoma tigrinum* from four ponds in Long Island, New York, for up to a year to examine adaptive flexibility in aquatic and terrestrial habitat use. Adults in two exposed breeding ponds preferred deep, vegetated areas. In a heavily shaded pond, the males segregated from the females and preferred nonvegetated areas, and in a pond with bluegills, the adults preferred shallow zones. On land, most resident salamanders remained close to a breeding pond that was immediately surrounded by a steep bank and woods, whereas few stayed close to exposed ponds with little ground cover. Salamanders were facultative emigrators, making major emigratory movements during spring, fall, or both, or not migrating at all. Two displaced salamanders showed normal pond activity but atypical terrestrial movements. Frequent predation occurred in small-mammal runways, most likely by short-tailed shrews. Salamanders excavated tunnels for temporary refuge but used small-mammal runway systems for long-term refuge. These new observations for *A. tigrinum* show adaptability in movements and habitat use during breeding and emigration consistent with the species' wide distribution in eastern North America.

JUNALUSKA SALAMANDER LARVAL LIFE HISTORY

T. J. Ryan [1998, J. Herpetology 32(1):10-17] studied the larval life history of *Eurycea junaluska* in three southwestern North Carolina populations. Populations were sampled quarterly over a 13 mo period and size-class analyses were used to evaluate the pattern of larval growth and metamorphosis. Young of the year appeared in the late spring and experienced rapid growth through the first summer. Growth slowed in the second year and metamorphosis usually occurred in the summer at about 25.5 mo post-hatching, although some data suggest that either 1 yr or 3 yr larval periods may be possible. The overall larval growth rate of *E. junaluska* is estimated at 1.27 mm/mo, much higher than in other stream-dwelling plethodontids. This species typically represents only about 10% of the larval *Eurycea* community, with adults even less common. The relative scarcity of individuals and the significant distance between documented populations raises concern about long term population viability in the face of declines due to either natural or anthropogenic causes, or both.

ADDITIONS TO THE KNOWLEDGE OF MÜLLER'S SNAKE

Z. S. Amr et al. [1997, Herpetozoa 10(3/4):163-168] examined 11 specimens of Müller's snake, *Micrelaps muelleri*, from several Jordanian and German Museums. This is a rare species, for which prior to this study measurements could be found in the literature for only seven specimens: two from Jerusalem, two from Syria and three from Jordan. This study included four further specimens from Syria and Jordan. The specimens are described by measurements and counts including the number of ventral and caudal scales, number of labials, body and tail length, and number of dark bands across the body and tail. A map is given, showing the distribution of this snake in the Middle East. A complete synonymy-chresonymy, considerations on the zoogeographic affinity of *M. muelleri*, and notes on its biology are included. This report also includes a translation into English of Böttger's original description of the genus *Micrelaps* and the species *muelleri*.

MIDWIFE TOAD REPRODUCTIVE BEHAVIOR

S. Böll and K. E. Linsenmair [1998, Amphibia-Reptilia 19(1):75-89] observed size-assortative mating in a field population of the midwife toad, *Alytes obstetricans*, a temperate zone species with extensive paternal care. During the more favorable mating season of 1987, larger males carried bigger single clutches, as expected from assortative matings. Furthermore, larger males experienced higher mating success over the whole season as well as during single egg carrying intervals. However, during the extraordinarily dry breeding period of 1988, no size-related male mating success was found. Males were in both years highly successful caretakers as far as hatching success of the tadpoles was concerned. Brood care was associated with conditional costs for egg-carrying males in 1988, but not in 1987. Neither hatching success nor hatching size of the tadpoles were correlated with male size. The authors discuss possible causes leading to the observed mating advantage of larger-sized males in some years but not in others.

GARTER SNAKE IMPACT ON TADPOLE PREY

S. J. Kupferberg [1998, J. Herpetology 32(1):84-92], to quantify the impact of garter snakes (*Thamnophis hydrophilus*, formerly *T. couchii*) on tadpole prey (*Hyla regilla*), experimentally examined whether: (1) garter snakes have greater impact on tadpole numbers or on behavior; (2) tadpole patch choice follows the rule of minimizing the ratio of mortality risk, μ , to foraging gain, g ; and (3) predator-induced resource avoidance influences algal production. In replicated enclosed pools constructed on gravel bars of a northern California river, garter snakes did not significantly reduce the number of tadpoles but did alter patch choice. Tadpoles spent less time in high food quality algae mats (*Cladophora glomerata* with epiphytic diatoms) and more time in low food quality patches (Zygnematales algae mats and sediments) when garter snakes were present than when they were absent. In mortality risk experiments, however, there were no significant differences in the numbers of tadpoles consumed among patch types, and garter snakes were not size selective. Therefore, patch choice did not follow the rule of minimizing μ/g . The change in patch choice was likely a consequence of the sublethal effect of garter snakes in which tadpole activity is decreased. For negatively buoyant tadpoles, decreased activity results in sinking away from floating algal resources. This apparent resource avoidance by tadpoles did not affect algal mass over the relatively short duration of the experiments.

A NEW DIPLOGLOSSUS FROM CUBA

R. Thomas and S. B. Hedges [1998, Copeia (1):97-103] describe *Diploglossus garrioi*, a new species of anguid lizard from the Sierra Maestra of eastern Cuba. It is most closely related to the only previously recognized Cuban species, *D. delasagra*, but is distinguished by snout shape, size of ear opening, head scalation, number of scale organs, and coloration. Morphological variation within *D. delasagra* is reexamined, and the eastern subspecies is recognized as a third Cuban species, *D. nigropunctatus*, on the basis of body size, dorsal and ventral coloration, and hemipenial structure. A sexually dimorphic and spinose structure adjacent to the cloaca, termed the ovolo, is described for males.

GLADIATOR FROG REPRODUCTIVE BEHAVIOR

M. Martins et al. [1998, Amphibia-Reptilia 19(1):65-73] observed agonistic encounters and facultative parental care in the gladiator frog, *Hyla faber*, in two localities in southeastern Brazil. Maximum male density was 0.9 and 3.3 males/m² in Campinas and Ribeirão Branco, respectively. Aggression was escalated and the highly variable aggressive calls were specific to each phase of the encounter. The last, more aggressive phases rarely occurred in Campinas; in Ribeirão Branco they occurred frequently. Male parental care (egg attendance) was common in Ribeirão Branco but never seen in Campinas. Egg attendance lasted 1-2 nights and was observed only during high male density; the main benefit seemed to be avoiding nest intrusion by other males (sunken eggs or embryos invariably die). Males may build additional nests during egg attendance, but attending males did not attract females (they did not call).

AGE DISTRIBUTION IN THE RAMSEY CANYON LEOPARD FROG

J. E. Platz et al. [1997, J. Herpetology 31(4):552-557] sectioned, stained and then examined toe bones from 80 individuals from two populations of the Ramsey Canyon leopard frog, *Rana subaquavocalis*, to estimate individual ages and to determine population age structure and growth curves. Large adults from the Ramsey Canyon population exceeded 100 mm in body length and had as many as 10 resting lines indicating that they were 11 years postmetamorphosis. In contrast the majority of the 38 specimens from the Barchas Ranch population were small, under 70 mm in body length, and were five or less years old. Growth curves for both populations were constructed based on body size and the number of resting lines in bone sections. Growth rates for males in the Ramsey Canyon population are lower than females. The population age structure revealed in this study has implications to conservation efforts. The findings suggest that the Ramsey Canyon population was composed largely of reproductive and very old reproductive individuals whereas at the time of analysis the Barchas Ranch population was larger and contained mostly prereproductive individuals.

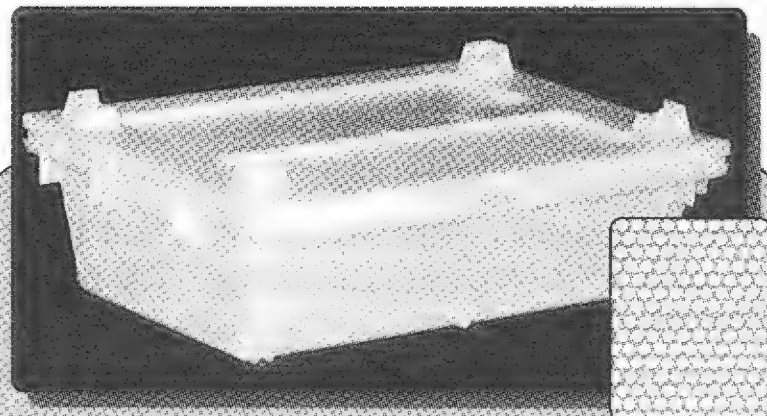
VOCAL BEHAVIOR IN THE MAJORCAN MIDWIFE TOAD

S. L. Bush [1997, J. Herpetology 31(2):251-257] describes vocal behavior and advertisement call structure of the Majorcan midwife toad (*Alytes muletensis*). Both sexes possess courtship vocalizations. Females called in response to calls of males, in the initiation of courtship, and while physically competing over access to mates. Females advertised for mates only when heavily gravid and in danger of losing their eggs. Advertisement calls of females were shorter, repeated at a faster rate, and produced at a lower sound pressure level than the calls of males. The sound pressure levels of both male and female calls were low relative to other anurans. Male body size was positively correlated with call duration and sound pressure level, and negatively correlated with dominant frequency. Female body size was not significantly related to any call parameters. The evolution of female advertisement calls is discussed with reference to other anuran species in which females are known to produce courtship vocalizations. A hypothetical evolutionary pathway is proposed in which a dispersed breeding habitat and a female-biased OSR facilitate the evolution of female advertisement calls.

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Breeders' Expo: Atlanta Georgia's 3rd annual Breeders' Expo is September 5, 1998. **Only non-venomous, captive-bred animals.** Contact Georgia Herpetological Society, P.O. Box 464778, Lawrenceville GA 30046, or David Bowman at (770) 505-0547, for more information.

For sale: *Bulletin* boxes, \$10 each. Library quality with "Chicago Herpetological Society" imprinted. Each container holds about two years' worth of *Bulletins*. Send check or money order to Chicago Herpetological Society, 2060 N. Clark Street, Chicago IL 60614. Allow four weeks for delivery.

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, 6115 SW 137th Avenue, Archer FL 32618, (352) 495-9024, E-mail <GrmtRodent@aol.com>.

For sale: murine-pathogen-free rats and mice available in all sizes, live or frozen: pinkies, fuzzies, crawlers, small, medium and large. Frozen crawler mice in lots of 2000, \$.17 each. Also available, full grown hairless mice. FOB shipping point. Master Card accepted. Call (518) 537-2000 between 8:00 A.M. and 5:00 P.M. or write SAS Corporation, 273 Hover Avenue, Germantown NY 12526 for prices and additional information.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice since 1989. Our mice are frozen separately and vacuum-packed to greatly extend freezer life by reducing freezer burning and preserving vitamin and nutrient content. We feed our colony a nutritionally balanced diet of Mouse Chow and four types of natural whole grains and seeds. Prices: pinkies, \$25/100; fuzzies, \$30/100; weaned, \$35/100. Quantity discounts available. Ray Queen, P.O. Box 85, Alpine TX 79831. Call (800) 720-0076 or E-mail us at <mousefac@overland.net>. Fax (915) 837-0156.

For sale: from Bayou Rodents, excellent quality feeder mice and rats. Every size available. Pinks starting at \$20/100. Orders are shipped by overnight service Monday thru Thursday. We accept Visa, MasterCard and Discover. For more info, contact Rhonda or Peggy, (800) 722-6102.

For sale: **high quality frozen feeders.** Over a decade of production and supply. Seven sizes of mice available: small newborn pinks up to jumbo adults. Prices start at \$25 per 100. Feeders are separate in the resealable bag, not frozen together. Low shipping rates. Free price list. Kelly Haller, 4236 SE 25th Street, Topeka KS 66605, (913) 234-3358 evenings and weekends.

For sale: In stock, Flex-watt and Ultra-therm heating products. **Frozen rodents** always available. Mice: pinks-crawlers, 3/\$1; weanlings, 40¢; subadult, 50¢; adults, 65¢; large adults, 75¢. Rats: small, 85¢-\$1; medium, \$1.25-2.00; large, \$2.25-2.75; jumbo, 3/\$10. Call on quantity discounts [note: discount on orders picked up at CHS meetings]. Live rodents available at higher prices. **Available now:** newsletter/catalog—many unique/hard-to-find herp husbandry items. Send business-size SASE for catalog, or call. Scott J. Michaels, D.V.M, Serpent City, P.O. Box 657, Island Lake IL 60042, (815) 363-0290.

For sale: Herp bags—colors vary, translucent ripcord nylon, super lightweight, extremely durable construction with hot corners sewn in, double seamed. Custom sizes made upon request. Sizes: 46" × 14", \$7 each; 24" × 12", \$6 each; 24" × 6", \$5 each. Shipping fees, \$1 for first bag, \$.30 each additional bag. Nicole Lechowicz, 290 Warren Road, #69, Carbondale IL 62901, (618) 457-2783.

For sale: The Wildlife Education Outreach Program (Lake Forest Recreation Department, Division of Nature & Outdoor Pursuits) is selling several rack systems as we are going to be putting most of our herps on public display. We have two Matrix Rack Systems; each unit can hold either three Sterilite sweater boxes or six Sterilite medium boxes. These units are brand new, and are complete with heat tape and boxes with drilled holes; just connect to a thermostat or rheostat, plug in and that's it. Paid \$400 for the entire rack system (2 pieces), will sell for \$225 (obo). Also have one used unit for \$50. Must pick up. Rob Carmichael, (847) 615-4388 or E-mail at: <CarmichR@CityLF.LFC.edu>.

For sale: books. *The World of Reptiles and Amphibians* by John Honders, 1975, 160 pp., many color, black and white photos, \$20; *George Cansdale's Zoo Book* by Cansdale, no date (probably 1950s), 64 pp., 73 good black & white photos, 7 pages on collecting in West Africa (including some herps, the rest on him being superintendent of the London Zoo), \$25; *The Age of Reptiles* by Edwin H. Colbert, \$16; *Reptiles Round the World* by Clifford Pope, 1957, 194 pp., many drawings, ex-lib., \$18. All books hardbound in excellent cond. Prices postpaid. William R. Turner, 7395 S. Downing Circle W., Littleton, CO 80122, (303) 795-5128.

For sale: Selling most of my collection. Great prices—some freebies! Some herps, but mostly arachnids. Andy Davies, (773) 279-1541.

For sale: one male and four female redfoot tortoises, \$150–200 each. Marc, (815) 293-0989 eves.

For sale: Hi-yellow leopard geckos, Brookfield Zoo stock, c.b. '98, beautiful, healthy babies, \$6 each. All proceeds go towards the Wildlife Education Outreach Program (Lake Forest Recreation Department, Division of Nature & Outdoor Pursuits Programs). Contact Rob Carmichael at (847) 615-4388, or E-mail: <CarmichR@cityLF.LFC.edu>.

For sale: '98 c.b. hatchling snakes. Yunnan beauty, \$60; Huachuca mountain king (*Lampropeltis pyromelana woodini*), \$100; Mexican milk (*annulata*), \$50; eastern milk, \$10. No list this year—watch this space. Bearded dragons and leopard geckos also likely to be available. Henry Cohen, 24 St. Johns Place, Buffalo NY 14201, (716) 881-6724.

For sale: Taking orders for exceptional Hondurans: albino, hypo, anerythristic possible het for albino, maybe a snow or two, plus three kinds of double hets—for snow, ghost and ??? (hypo and albino). Available now: 1997 hatch albino and het *nelsoni*; one male 1996 hatch Honduran possible double het for snow (definite het/albino, 50% chance het/anerythristic); one male 1997 hatch het/albino Honduran. Diverse bloodlines, only perfect animals shipped, price protection. Terry Dunham, ALBINO TRICOLORS, (813) 824-0705 (before 10 P.M.ET please), E-mail <rtunham@earthlink.net>. [FL]

For sale: 1998 prospective hatchlings—Baird's rat snakes, prairie kingsnakes, California kingsnakes, \$25 each; red milksnakes, \$35 each; Mexican black kingsnakes, \$40 each; trans-Pecos rat snakes, \$45 each; albino speckled kingsnakes, Sinaloa, Pueblan, Mexican milksnakes, San Luis Potosí kingsnakes, \$50 each; Ruthven's kingsnakes, \$75 each; *thayeri*, *greeri*, graybands, \$100 each; Arizona mountain kingsnakes, \$125 each. Some breeders available. Steve Mitchener, (405) 748-6566 (after 5 P.M. CT). [OK]

For sale: c.b. '98 hatchlings from the following projects. */Drymarchon/* Texas indigos (*D. corais erebennus*), \$300 each; blacktail cribs (*D. c. melanurus*), \$150 each; Mexican indigos (*D. c. rubidus*), \$350 each; */Pituophis/* Louisiana pines (*P. ruthveni*), \$275 each; albino bulls (*Pituophis melanoleucus sayi*), \$150 each; anerythristic San Diego gophers, \$125 each; */getula/* Outer Banks kingsnakes (*Lampropeltis getula sticticeps*), \$200 each; Cal. kings (rare Davis locale), \$40 each. Also, trans-Pecos blonde, hognose and Honduran projects. Call Brad for details (all hatchlings will be properly sexed and feeding). Brad Scialabba (Chicagoland), (708) 749-3864 after 6 P.M. or leave message.

For sale: one male and one female Brooks' kingsnakes, c.b. '95, bright yellow, \$50 each; one male and one female 6' pine snakes, c.b. '95, high contrast, \$50 each; one male and two female Mexican rosy boas, c.b. '95, \$70 each; two adult female blue-tongue skinks, \$100 each. Also, 4' Neodesha cage with glass doors, elongated vent, litter dam, like new, \$160. (708) 361-5835.

Advertisements (cont'd)

For sale: **Premium captive-produced reptiles.** **Piebald black pines;** Brazilian rainbow boas (Lamar); blonde trans-Pecos rat snakes; Baja rat snakes; gray-banded kingsnakes (Langtry); Okeetee corns; melanistic garters (double hets); Peruvian matamatas; Mexican redleg tarantulas. Also, feeder mice and rats, husbandry items, bedding, etc. Mike Stefani, (630) 372-3936.

For sale: beautiful, tricolor kingsnakes. Send SASE for **free** list. Also, free phone consultation on snake husbandry problems as a service to the herp community. Robert Applegate, P.O. Box 338, Campo CA 91906, (619) 478-5123. Thank you for your attention.

For sale: one male and one female woma, c.b. 6/97, 4' long, Hamper stock, gorgeous, \$5200/pair; one 12" female axanthic Kenyan sand boa, c.b. 11/97, excellent color (black and white), \$185; one male and one female bearded dragons, c.b. '97, male 14-15", female 12-13", nice pattern, very tame, \$250/pair; one 3' female Dumeril's boa, c.b. '97, nice crisp pattern with pink highlights, \$200. Call (619) 265-7557. {San Diego}

For sale: one male and two female **Indian pythons** (*Python m. molurus*), subadults, \$750/trio [federal permit required]. Also big python cages with sliding glass front made by Custom Cages Co.: one 8' x 2' x 3' with partition, \$350; one 4' x 2' x 3', \$250. Whole package, \$1200. Louie, (773) 477-0773.

For sale: diamond and jungle carpets, \$175 each; Macklot's pythons, \$100 each; Children's pythons, \$100 each; creamsicle corns, \$40 each; albino corns, \$22 each; snow corns, \$20 each; bubblegum corns, \$25 each; candy-cane corns, \$35 each; het creamsicle corns, \$15 each; Vegas Cal. kings, \$20 each. **Adults:** creamsicle, \$60; het ghost, \$60; Children's python, \$150; ball pythons, \$175/pair; Dumeril's, \$600/pair; Argentine rainbows, \$500/pair; Haitian boas, \$150/pair; Brazilian rainbows, \$250 each; Indonesian bluetongue skinks, \$55 each. Flexwatt heat tape, \$2.50/ft, \$5 each connection. Steve Bostwick (515) 274-4580, E-mail <liasias@juno.com>. [IA]

For sale: Brazilian rainbow boas—2-year-old, 3' female, tame, healthy and a great eater, \$250—7-month-old female, \$175; lavender phase Cal. king, \$50. Mark, Strictly Serpents, (847) 854-3259.

For sale: Send SASE to CRC, P.O. Box 0731, Las Vegas NV 89125-0731 for brochures and list of species available. Limited bookings available for guided tours of herpetological collection sites in Nevada. Call/fax (702) 450-0065. URL <<http://www.herp.com/crc/>> E-mail <crsafety@aol.com>.

Free for the hauling: 190-gallon homemade fiberglass-floor pond used for aquatic turtles, 77" L x 48" W x 12" D. Also wooden enclosure and nesting box. Phil Drajeste, 8012 Greenwood Avenue, Munster, IN 46321, (219) 838-8032. E-mail: <PDrajeste@aol.com>.

Tours: Adventure tours to Madagascar! Join **Bill Love** seeing and photographing fauna and flora, heavily herp-biased, across the world's least known mini-continent. Maximum fun & photo ops assured on every trip. Contact him at: BLUE CHAMELEON VENTURES, P.O. Box 643, Alva FL 33920. TEL: (941) 728-2390, FAX: (941) 728-3276, E-MAIL: <blove@cyberstreet.com>.

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Wanted: Anyone interested in starting a rodent-breeding business. I have cages, rats mice, auto water system etc. If you have property in the Chicago area and want to get involved, call me! Brad Scialabba, (708) 749-3864, leave message.

Wanted: big-headed turtles; mata mata turtles; Mexican giant mud turtles (*Staurotypus triporcatus*); exceptionally large common snappers (45 lbs. & up); large alligator snappers (over 90 lbs.); spectacled caiman from Trinidad, Tobago and Surinam; dwarf caiman; smooth-fronted caiman; albino turtles (except red-eared sliders). Walt Loose, (610) 926-6028, 9:00 A.M. – 1:00 P.M. or after 11:30 P.M. Eastern Time.

Wanted: Styrofoam boxes, any size or shape so long as they're not flimsy, preferably with cardboard liners, willing to pay from \$2 to \$5. Bring to CHS meetings. Scott J. Michaels, D.V.M., Serpent City, (815) 363-0290.

Line ads in this publication are run free for CHS members — \$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to: Michael Dloogatch, 6048 N. Lawndale Avenue, Chicago IL 60659, (773) 588-0728 evening telephone, (312) 782-2868 fax, E-mail <MADadder0@aol.com>.

Unofficial Minutes of the CHS Board Meeting, May 15, 1998

The meeting was called to order at 7:50 P.M. Board members Karen Bielski and Jack Schoenfelder were absent.

Officers' and Committee Reports

The minutes of the April Board of Directors meeting were read, corrected and accepted.

The Treasurer's report was read and accepted.

Membership: Current membership is 1042. Gino Martinez will be sending "We miss you" postcards to expired members.

President: Steve Spitzer discussed the need to think about this year's nominating committee. Steve also noted that Bob and Dan Bavirsha had been left out of last month's minutes as participants in the "Chances for Children" adoption fair.

ReptileFest: The Treasurer's report from ReptileFest was reviewed. Lori King-Nava reported that she has sent thank-you cards to those of the media who helped promote this year's show. Lori also reported that Northeastern University would like to host ReptileFest again in 1999. The committee will be meeting to tally up visitor surveys and to create a new vendor registration form. Lori informed the board that the money raised from the beanie babies "sale" at ReptileFest (\$1,000+) has been sent to the International Iguana Society. The donation will be used by the IIS to help save the Booby Cay iguana, *Cyclura carinata bartschi*, a Bahamian rock iguana on the verge of extinction. Lori has volunteered to write a *Bulletin* article on the Iguana Squad's activities and involvement in the IIS. Lori King-Nava and Gary Fogel announced that they will continue to co-chair the ReptileFest Committee. A motion was made by Ron Humbert and seconded by Audrey Vanderlinden

to reimburse Lori King-Nava \$750 for out-of-pocket expenses for ReptileFest. The motion passed with 8 voting in favor and Lori King-Nava abstaining.

Grants Committee: John Driscoll reported that the committee will meet on Sunday, May 17, to award this year's grants.

Old Business

CHS Website: the CHS website will be moved to the server at the Chicago Academy of Sciences. It will still be maintained by Jennie Picciola with assistance from web page designer, Garret Starke and CAS webmaster Chris Dunn. The page will be equipped with a new counting device.

Zoo Trip: Ten seats are still open for the St. Louis Zoo bus trip on June 14.

Round Table

John Driscoll inquired about the date of the ReptileFest debriefing meeting and was informed that it would take place at Audrey's house sometime after the surveys are tallied.

Lori extended a special thank-you to Bob Applegate and Jim and Alberta Picciola for their help during ReptileFest setup and to the Klingons for their help with security.

Jennie Picciola mentioned that she obtained a copy of the videotape from the ABC morning program featuring ReptileFest. This tape was a gift to the CHS from the P.R. director at the Shedd.

Steve ended the roundtable discussion by exclaiming what a great time he had at ReptileFest.

The meeting adjourned at 9:20 P.M.

Respectfully submitted by Recording Secretary Jennie Picciola

News and Announcements

1998 CHS GRANT RECIPIENTS

The following individuals have been awarded CHS Herpetological Grants in 1997:

- **Dawn Ford and Don Moll**, Southwest Missouri State University. "Study of Migration Paths and Habitat Selection of *Trachemys scripta elegans* Hatchlings in West-central Illinois." Awarded \$250.
- **Chuck Knapp**, University of Florida. "Population Dynamics of an Introduced Iguana (*Cyclura cychlura inornata*) Colony in the Exuma Land and Sea Park, Bahamas." Awarded \$500.
- **Jason Kolbe**, Iowa State University. "Size and Demographic Status of a Population of Threatened Western Hognose Snakes, *Heterodon nasicus*, from the Thomson-Fulton Sand Prairie." Awarded \$250.
- **John P. Levell and Connie L. Levell**, NorthStar Herpetological Associates, Lanesboro MN. "Herpetological Survey — Fillmore County, Minnesota." Awarded \$250.
- **Bradford R. Norman**, 2232 Parkwood Boulevard, Eureka CA. Three proposals: "Analyze Field Data Collected During Distributional Surveys for the Del Norte Salamander (*Plethodon elongatus* Van Denburgh) in Northwestern California, 1993 through 1998"; "Monitor Del Norte Salamander (*Plethodon elongatus* Van Denburgh) Populations at the U.S. Forest Service Timber Sale in Northwestern California throughout 1998"; and "Study Predation in and Reduce an Introduced Population of the Bullfrog (*Rana catesbeiana* Shaw) at Fish Lake, Humboldt County, California." Awarded \$500.
- **Daniel A. Warner**, Iowa State University. "A Population of *Cnemidophorus sexlineatus* in Northwestern Illinois and Its Response to Prescribed Burns." Awarded \$250.
- **R. Mark Waters**, The University of Tennessee-Knoxville. "The Effect of Snake and Crayfish Size on Prey Handling Time in Crayfish-Eating Snakes." Awarded \$250.

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, June 24, at the Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, in Chicago. This will be our ever-popular annual Show & Tell meeting. Bring an animal that you find interesting for one reason or another and be prepared to give a short (under 5 minutes) presentation to the group. Don't be shy. Age (yours) or commonness (the animal's) should not be a limitation. Guidelines for the occasion, based upon previous experiences: please don't bring venomous reptiles or endangered species, and please bring only amphibians or reptiles (this means no worms, tarantulas or other invertebrates).

The program for the July 29 meeting has yet to be determined. Check this space next month for the announcement.

We are required to use the entrance on the west side of the museum. **We are allowed to use the free parking lot to the west of the museum as long as space is available. Your best bet is to try that lot first before settling for the lot to the east of the museum or for the Soldier Field lot. For the latest on the parking situation call our CHS message line, (773) 281-1800, before you come.** Public transportation is an option: the Roosevelt Road (12th Street) bus now goes directly to the museum, thus providing a connection with the el and subway. This bus service runs until 11 P.M.

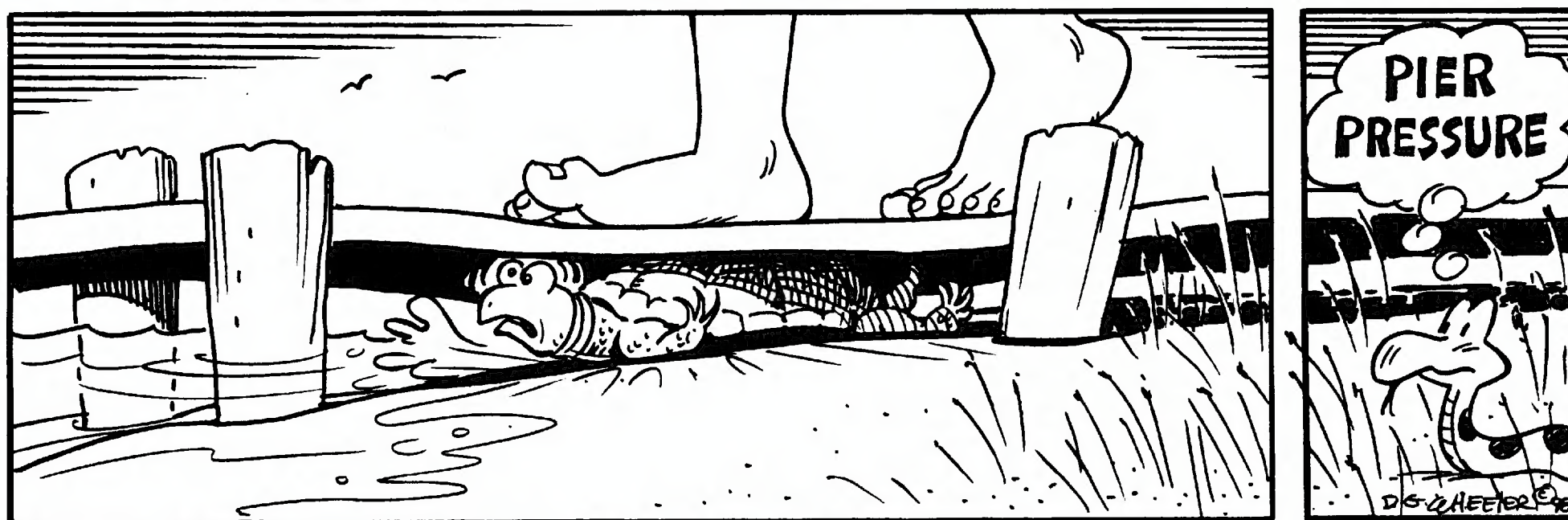
Turtle Club

The Chicago Turtle Club will meet Sunday, June 21, 1:00–3:30 P.M., at the North Park Village Administration Building, Room 105, 5801 N. Pulaski, in Chicago.

MOVING??

Please let us know in plenty of time of any change in your mailing address. The *Bulletin of the Chicago Herpetological Society* is sent to our U.S. members by bulk-rate third class mail. This means that the U.S. Post Office will not forward your *Bulletin* with the rest of your mail. This is so even if you make a special request that your magazines be forwarded (such a request only applies to second class mail).

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